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Recent Literature on Cosmic Rays
p. 1141

September 1958 No. 9

METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

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*EDITORIAL OFFICE: Washington, D. C. P.O. ADDRESS: Box 1736, Washington 13, D. C. Telephone: REpublic 7–6278.

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METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY is a monthly publication devoted to:

A. Current Abstracts in English on important meteorological literature in every language.

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METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

MALCOLM RIGBY, Editor

Vol. 9 SEPTEMBER 1958 No. 9

SPECIAL FEATURE IN THIS ISSUE

Recent Literature on Cosmic Rays

By
Robert Panara

(For complete table of contents see back cover)

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FOREWORD

Meteorological Abstracts and Bibliography is a monthly publication whose purpose is to ng to the attention of meteorologists current literature in their field and in related fields and provide bibliographic information on various subjects, as interest demands.

Part I contains abstracts of current literature in the fields of meteorology, oceanography, ., arranged according to the Universal Decimal Classification.

Part II of each issue comprises an annotated bibliography of important references on a cial subject (usually arranged chronologically). No attempt is made to prepare exhaustive liographies; instead, the aim is to include a representative cross section of the various ects of a subject.

Bibliographies published in the successive issues were:

Vol. I, 1950

Atmos. Pollution	2. Aerobiology	3. Cloud Physics	4. Hail
Tornadoes	6. Volcanic Dust	7. Climat. Changes	8. Thunderstorms
Icing	10. Acoust. Propagation	11. Evaporation	

Vol. II, 1951

Extended Forecast.	2. Long Range Forecast.	3. Soil Temp.	4. Constants, etc.
Clim. of Near East	6. Clim. of Middle East	7. Special Winds	8. Radar Storm De-
Condensation Trails	10. Clim. of N.E. Africa	11. Mountain Met.	tect.

Vol. III, 1952

Clim. of N.W. Africa	2. Carbon Dioxide	3. Clim. of Argentina, etc.	4. Dew
Objective Forecast.	6. Stratus Forecast.	7. Urban Climatology	8. Clim. of C. Africa
Visibility	10. Glaze and Rime	11. Free Air Turbulence	

Vol. IV, 1953

Turbulence Theory	2. Turbulent Diffusion	3. Frost	4. Clim. of Australia, etc.
High Level Winds	6. Winds in Stratosphere	7. Jet Stream	8. Radiation Bioclim.
Clim. of Pacific	10. Auroras	11. Sferics	

Vol. V, 1954

Oceanog. Met.	2. Clim. of S.E. Asia	3. Auroral Physics	4. Tropopause
Balloons	6. Numerical Forecast.	7. Radiation Data	8. Vertical Motion
Clim. of Arctic	10. Industrial Met.	11. Wind Waves and Swell	

Vol. VI, 1955

Bibliog. of Bibliog.	2. Texts & Monogr. Bibliogs.	3. Storm Surges	
Ionospheric Prop.	5. Photochem.—Upper Atmos.	6. Cloud Physics	
Radar Cloud Physics	8–9. Atmos. Nuclei	10. Weather Modification	11. Cooling Power

Vol. VII, 1956

Synoptic Met.-Arctic	2. Clim. of Enclosed Spaces	3. Cosmic Rays (–1952)
Cosmic Rays (1953–56)	5. Atmos. Radioactivity	6. Inversions
Snow Micromet.	8. Snow Micromet. (Suppl.)	9–11. Tropical Cyclones

Vol. VIII, 1957

Solar Weather Relations	2. Night Airglow	3. Forecasting Special Elements
Forest Micrometeorology	5. Hydromet. Forecasting	6. Numerical Forecasting (Suppl.)
Albedo 8. Meteors	9–10. Tropospheric Propagation	11. Medical Meteorology

Vol. IX, 1958

Radioastronomy	2. Solar Astrophysics	3. Radioactivity in Atmosphere
Waves and Currents	5. Physical Oceanog.	6. Dynamic & Phys. Oceanog.
Long Range Forcasting	8. Radar Met.	9. Cosmic Rays

Other bibliographies in preparation are:

Actinometers	*Mesometeorology*	*Radiation*
Geomagnetism	*Micrometeorology*	*Singularities*
High Atmosphere Temperatures	*Ozone*	*Synoptic Aerology*

Part III contains a listing of reviews, translations, reprints, and the contents of important lications. These are published in the earliest issue where space permits.

Part IV is made up of author, subject and geographical indexes. The December issue nprises cumulative author, subject, geographical and journal indexes.

EXPLANATIONS

Location of material: For each entry, a symbol is given for at least one library where the material may be found. The Union List of Serials (Gregory) is the source of most of the symbols used. In some cases, where no symbol has been assigned to a library, one will be devised according to the principles of the Union List.

Library symbols used frequently may be found in the following list:

DA:	U. S. Dept. of Agriculture Library, Washington, D. C.
DBS:	U. S. Bureau of Standards Library, Washington, D. C.
DGS:	U. S. Geological Survey Library, Washington, D. C.
DLC:	Library of Congress, Washington, D. C.
DN-HO:	U. S. Navy Hydrographic Office Library, Suitland, Md.
DNLM:	U. S. National Library of Medicine, Washington, D. C.
DSI:	Smithsonian Institution Library, Washington, D. C.
DWB:	U. S. Weather Bureau Library, Washington, D. C.
GB-MO:	Great Britain, Meteorological Office Library, Harrow, England.
MH-BH:	Harvard University, Blue Hill Observatory Library, Milton Mass.

Other symbols:

*	before an entry indicates a good data source.
†	before an entry indicates a good bibliography.
§	before an entry indicates a synoptic case history study accompanied by charts

Geographic locations are in the English form rather than the form used locally, for example Moscow for Moskva.

Titles of articles or monographs are in the language of the original article unless otherwise stated. Slavic (Cyrillic) titles are transliterated into the Roman alphabet according to the Library of Congress transliteration scheme.

Abbreviations:

Titles of periodicals are not abbreviated, as a rule.

The months of the year from March to July are not abbreviated. Other months are abbreviated as Jan., Feb., Aug., Sept., Oct., Nov., and Dec.

The word or abbreviation for Volume (Tom, Band, Jahrgang, Año, etc.), for Number (Heft, Fascicule, Vypusk, etc.) and for page or pages is omitted from most entries. Thus an entry will read as follows:

Meteorologische Rundschau, 2(5/6):146–151, May/June 1950.

This indicates that the article appeared in *Meteorologische Rundschau, Jahrgang* 2 (Vol 2), *Heft* 5/6 (No. 5/6), *pages* 146–151, May/June 1950.

PART I. ABSTRACTS OF CURRENT METEOROLOGICAL MATERIAL

MAJOR GENERAL WORKS

COLLECTED WORKS

See also: **Meteorology in literature** (Spectorsky), 9.9–15; **Radio noise meas. techniques** (Beynon, Brown), 9.9–31; **IGY instruction manuals**, 9.9–33; **Netherlands participation in IGY**, 9.9–44; **Report of Rainmaking, Japan** (Hatakeyama), 9.9–145.

9.9–1 551.5(99) 551.582(99)

***†Meteorology of the Antarctic,** ed. by M. P. van Rooy. Pretoria, South Africa, Weather ureau, **1957.** 240 p. figs. (some fold.), tables, map (in pocket). Bibliog., p. 233–240 (330 s.). **DWB.** Review in *Weather*, 13(7):244–245, July **1955.** Review in *World Meteoro-ical Organization, WMO Bulletin*, 7(2):94–95, April 1958.—This is one of the epochal iblications of the decade, covering systematically if not exhaustively the many aspects of ntarctic meteorology and climatology, and local data for the oceans, islands and various rtions of the continent for which data are available. It is complete with glossy photos of acier, snow, ice and ocean features, clouds, large charts, numerous tables and graphs, lists expeditions and >300 references to the best scientific sources of meteorological data or formation—in fact—a complete climatology of this little explored area of globe up to the ginning of IGY. The fact that the area south of 50°S. has an almost ideal planetary climate uniform world-wide areas of water snow or ice uninterrupted by minor topographic features, here the climate depends only on latitude, altitude, season (and whether water or ice) should ake this a contribution to global climatology, especially since the data presentations and alysis are more sophisticated than is the case with many such elegant studies of geographical eas. The volume was planned by Dr. T. E. W. SCHUMANN, Director of the S. African eather Bureau, as a companion volume to an elaborate bibliography (>4000 entries) of ntarctic meteorological literature. Chap. 1) covers the geography and hydrology; Chap. 2) e sources of meteorological data; Chap. 3) instrumentation and observation of special ements in Antarctic; 4) pressure; 5) precip. and evaporation; 6) climate of Antarctic seas; of sub-Antarctic islands; 8) of Antarctic coast; 9) of Graham Land Region; 10) upper air nditions (temp. and wind); 11) history and problems of synoptic analysis of the Southern emisphere, anticyclones, depressions, cyclone tracks, pressure types, etc. For listing of ntents, *see* p. 914, July 1958, *MAB*. Articles abstracted separately. *Subject Headings:* **1. eteorology of Antarctic 2. Antarctic climatology 3. Antarctic meteorology bibliographies. Schumann, T. E. W.** (*ed.*) **II. Hofmeyr, W. L.** (*ed.*) **III. Venter, R. J.** (*ed.*).—*M.R.*

9.9–2 550.3(08)

†Advances in Geophysics, Vol. 4. Ed. by H. E. Landsberg and J. Van Mieghem. N. Y., cademic Press, **1958.** 456 p. tables, figs., eqs. Bibliog. at end of each section. **DWB, LC**—This fourth volume of the excellent review series begun in 1955 by H. E. LANDSBERG ntains a long and detailed review of the phase of atmospheric chemistry involving trace ements; or chemical constituents which vary with time and space (by C. E. JUNGE); another 0 page review of recent auroral knowledge and theory (by JOSEPH W. CHAMBERLAIN); one the effect of meteorites on the earth, on people, and on vehicles (by LINCOLN LAPAZ); one smoothing and filtering of time and space series in meteorology (by J. L. HOLLOWAY, JR.) d one on earth tides (by PAUL J. MELCHIOR). All contain extensive bibliographies and data bles, diagrams; etc. For listing of contents, *see* Pt. III, p. 905, July 1958, *MAB*. All ticles abstracted separately (*see* 9.9–16 to –20). *Subject Headings:* **1. Advances in Geo-ysics. I. Landsberg, H. E.** (*ed.*) **II. Van Mieghem, J.** (*ed.*).—*M.R.*

9.9–3 551.555.3:016 551.577.38:01

†Akademiia Nauk SSSR. Institut Geografii, **Sukhovei ikh proiskhozhdenie i bor'ba s nimi.** [Dry winds, their origin and control.] Moscow, Akademiia Nauk SSSR, **1957.** 370 p figs., tables, bibliogs. at end of many ch. "Bibliog. on dry winds and droughts and contro measures," p. 354–367. **DLC** (QC940.R9A6)—Drought or hot dry winds are considered t be the most important of the natural phenomena which could frustrate an all out effort t increase the general level of crop production in the U.S.S.R. A number of papers on thi subject were published in 1953 by the *Izd-Vo A.N. SSSR* (Microclimatic and climatic researc in the Pricaspian Depression) emanating from 3 conferences sponsored by the Inst. of Geog raphy of the Akademiia Nauk. Work has progressed along these lines. For instance, i Dec. 1953 a symposium was sponsored by the Inst. of Geography with participants from th Geophysical Institute of the A.N. SSSR, the GGO, Central Institute of Forecasting, All-Unio Institute of Agriculture and Agrophysical Institute of Vaskhnil, and of the A.N., Ukr. SSR and Moscow, Kharkovsk, Saratovsk and Central Asiatic Univ., Kiev and Kazan Hydro meteorological Institute, Omsk and Kharkovsk Agricultural Institute, etc. Problems treate were in the general areas of: 1) causes, criteria and extension of drought and dry winds, 2) kata batic or advective winds and their role in hot dry winds, 3) the role of wind itself, 4) of evapora tion and its observation and study, 5) of methods of effectively controlling drought. Proceed ings were discussed in article by G. N. Vitvitzkiĭ in *Akad. Nauk SSR, Izvestiia, Ser. Geog* No. 2, 1954 (*see* 8.4–231, April 1957, *MAB*). Articles cover synoptic conditions, forecasting climatology, historical droughts (since 994 A.D.), droughts in European and in Asiatic Kazakstan, Uzbekistan, etc., microclimatic effects, shelterbelt effects, agricultural and meteoro logical criteria of drought, ground water, irrigation and other effects. An author bibliography of >400 Russian items (1917–1955) is appended. For listing of contents, *see* Pt. III, July 1958, *MAB*. Articles abstracted separately. *Subject Headings:* **1. Drought symposia 2. Sukhovei 3. Dry winds bibliographies 4. Drought bibliographies 5. U.S.S.R.**—*M.R.*

9.9–4 551.5(08) 551.579(08

Akademiia Nauk Uzbekskoĭ SSR. Institut Matematiki i Mekhaniki, **Meteorologiia i gidrologiia v Uzbekistane.** [Meteorology and hydrology in Uzbekistan.] Tashkent, **1955** 326 p. figs., tables, refs., eqs. **DLC**—This volume contains articles by different authors o various aspects of the geophysics of Uzbekistan. The individual papers are arranged accordin to the following categories: Meteorology and climate, dynamic and synoptic meteorology aerology; hydrology and terrestrial magnetism, atmospheric electricity and seismology. (A the articles except those on seismology are abstracted and will appear in *MAB*. For listin of contents, *see* p. 1558, Nov. 1957, *MAB*.) *Subject Headings:* **1. Meteorology 2. Hydrolog 3. Collected works 4. Uzbekistan, U.S.S.R.**—*I.L.D.*

9.9–5 551.5:6:06

National Conference on Applied Meteorology, Hartford, Conn., Oct. 28–29, 1957, **Proceedings of the First National Conference (Sponsored by American Meteorological Society)** Issued **1957.** Each section repaged. **DWB** (M A512pro)—Includes some two dozen paper presented at the conference, and some of the discussions. Each paper will be abstracte separately. For listing of contents, see Pt. III of this issue. *Subject Headings:* **1. Applie meteorology conferences. I. American Meteorological Society.**—*G.T.*

TEXTBOOKS

9.9–6 551.481.1(02

†*Hutchinson, George Evelyn (*Dept. of Zoology, Yale Univ.*), **Treatise on limnology, Vol. Geography, physics, and chemistry.** New York, John Wiley; London, Chapman & Hal **1957.** 1015 p. 228 figs., 132 tables, bibliog. and index of authors, p. 913–978. List symbols, p. 903–912. **DLC** (QH98.H82)—This is one of the most refreshing books to com out during the past few years. It is the first of two volumes on Limnology—the second wi treat the biology, ecology, and stratigraphic aspect of lakes. The 17 chapters which are interest to meteorologists concern: 1) origin of lakes; 2) morphology; 3) the properties of wate 4) the hydrologic cycle and water balance of lakes; 5) hydromechanics of lakes; 6) optic

operties; 7) thermal properties; 8) inorganic ions of rain, lakes and rivers; 9) oxygen in lake ater; 10) CO_2 and pH concentration; 11) iron cycle; 12) phosphorus; 13) sulfur; 14) silver;) microelements; 16) nitrogen cycle. A very extensive bibliography, list of lakes, and subject dex are appended. Of special interest to meteorologists are the sections in Ch. I. on glacial d wind formation of lakes and in Ch. IV. on precip. lake level relations, Ch. V. on currents, aves and seiches, Ch. VI. solar radiation, reflection, absorption, transmission, illumination, tinction, scattering, polarization, color mirages, solar or lunar paths, cosmic radiation, etc., h. VII. heating, stratification, winter heating, ice effects, turbulence, eddy conductivity, at budgets of lakes of the world, wind work, stability, energy exchange, evaporation, effects surrounding climate, lake ice, and in Ch. VIII. on the chemistry of rain water. Most of ese sections are quite extensive, covering every aspect of the subject treated in the literature to 1954 (over 1600 references are cited), and presenting voluminous graphic, tabular and rtographic data. *Subject Headings:* **1. Limnology textbooks 2. Limnology bibliographies Optics of lakes.**—*M.R.*

9.9–7 551.594.2:016:551.515.4:621.316.98(02)

†Řihánek, Ladislav V. and Postranecký, Josef, **Bouřky a ochrana před bleskem.** [Thunderstorms and lightning protection.] Prague, Československá Akademie Věd, **1957.** 07 p. numerous figs., 5 charts fold., refs., bibliog. p. 473–478. Review (in Czech) by Podzimek in *Meteorologické Zprávy*, 11(2):52–53, **1958.**—In this thorough monograph, roblems of thunderstorm electricity and lightning protection are treated in a general and applied section. The general section includes a brief discussion of atmospheric structure nd circulation and a thorough review of theories and knowledge on atmospheric ionization, ectrical fields in the atmosphere, the formation of convective clouds, thundercloud elec- ification, classification of thunderstorms, thunderstorm distribution over the globe and in zechoslovakia (map, tables, graphs), the structure and mechanism of various types of lightning rokes, electrical currents induced by lightning and their measurement, grounding under arious soil conditions, etc. A survey is also made of thunderstorm and lightning research various countries (p. 147–205) including the U.S.S.R., Sweden, Switzerland, U. S., Great ritain, Germany and Czechoslovakia. An extensive chapter on instruments and techniques . 205–294) concludes the general section. The whole section is profusely illustrated with xplanatory diagrams, photographs of lightning and of instruments, block diagrams, sample ecords, etc. (illustrations are, to a large extent, reproduced from foreign literature). The econd (applied) section was written for lightning rod designers and inspectors. It contains xcerpts from the Czechoslovak official specifications for the protection requirements of ifferent objects, and detailed review and comparison of the Soviet, American, British, Polish, wiss, South African, Swedish, Dutch and German specifications. Numerous examples of ghtning rod design for various structures are given in diagrams and photographs. Added eatures which contribute to the interest of the book are: a historical summary from FRANKLIN, OMONOSOV and DIVIŠ (first grounded lightning rod, 1754) to the present; a bibliography of zechoslovak and foreign literature (some 450 items listed by author, title and source) which upplements the lists of references given at the end of each chapter; a polyglot dictionary Czech-Russian-English-French-German) of over 600 meteorological and electrical terms; list of symbols, abbreviations and units; a short glossary of technical and engineering terms n Czech); and a subject index. By combining scientific and technological aspects in con- derable detail, the authors of this book made an original and valuable contribution to the eld of thunderstorm research and lightning protection. *Subject Headings:* **1. Thunderstorm lectricity textbooks 2. Thunderstorm electricity bibliographies 3. Lightning rod design Polyglot dictionaries 5. Czech language 6. Czechoslovakia.**—*G.T.*

9.9–8 551.509.2/3(02)

†*Zverev, A. S., **Sinopticheskaia meteorologiia.** [Synoptic meteorology.] Leningrad, idrometeoizdvo, **1957.** 558 p. 221 figs., 28 tables, eqs. Bibliog. p. 545–552. **DLC** QC861.Z9)—A new advanced textbook on synoptic analysis and forecasting, with sections on: General, historical and service aspects of synoptic meteorology and codes, analysis and fore- asting; II. Techniques of analysis of charts of all types, including cross sections, condensation ystems, wind fields, etc.; III. General circulation, sources, centers of action, fronts, jet stream,

climatological aids, zonal circulation and circulation in various zones, energy transformation IV. Changes (advective and dynamic) in elements with time-local changes; V. Air masse (their sources, transformation, character, frequency and analysis); VI. Fronts (warm, cold occlusions, orographic influences and analysis); VII. Cyclones and anticyclones; VIII. Fore casting by various systems used in U.S.S.R., Germany, U. S., etc.; IX. Forecasting actua weather, winds (squalls, blizzards, dust storms, turbulence), temp., clouds and their uppe and lower limits, precip., thunder, fog, icing at surface and aircraft icing. Considerabl western material is used in this text. *Subject Heading:* **1. Synoptic meteorology.**—*M.R.*

9.9–9 551.582(794) 551.46(794

§†Zierer, Clifford M., (*ed.*), (*Univ. of Calif., L. A.*), **California and the Southwest.** N. Y John Wiley; London, Chapman & Hall, **1956.** 376 p. numerous figs., tables, refs. Ch. 4 p. 25–37, Leighly, John; **Weather and climate.** 11 figs., 2 tables, refs. Ch. 9, p. 80–96 Horrer, Paul and Revelle, Roger: **The ocean off the California Coast.** 9 figs., table, 12 refs **DLC** (HC107.A165Z5)—The chapter on weather and climate approaches the subject from th point of view of the synoptic weather types prevailing during the summer and winter, re spectively. Summer types include "normal" summer weather, summer showers, and th warm and dry types. Winter includes "normal," cold, and stormy types. The precip snow and temp. regimes for California, Nevada, Utah and Arizona are discussed and illustrate by original charts (isohyetal and annual regime for 9–11 stations) and selected tabular data Ch. 9 (by HORRER and REVELLE) on p. 80–96 gives an equally good treatment of the ocean ography (temp., waves, currents) of the Calif. coastal waters (*Scripps Inst. of Oceanograph Contribution*, No. 844). *Subject Headings:* **1. Climate of California 2. Climate of Southwes 3. Oceanography of California coastal waters 4. California. I. Leighly, John.**—*M.R.*

9.9–10 551.586:574.9(02

†Dansereau, Pierre Mackay (*Botanical Inst., Univ. of Montreal*), **Biogeography: an eco logical perspective.** N. Y., Ronald Press, **1957.** 394 p. numerous figs., tables, bibliog p. 337–354. Price: $7.50. Review by J. Heslop-Harrison in *Nature*, 181(4609):586, March **1958. DLC** (QH541.D3)—Ch. 2, Bioclimatology (p. 56–123), discusses: 1) factors and ele ments of climate, 2) indicators of climatic stress, 3) regional life-form spectra, 4) characteristic of climatic zones of the earth, 5) climatic regimes and trends, 6) plant formation classes 7) effects of altitude, 8) climates and communities of the past, 9) climatic change, 10) laws c climatic response. Much of the illustrated material is adapted from other sources. Th classifications and their adjuncts (climagrams, laws, discussion of biochores, etc.) are for th purpose of establishing the limits and the most favorable environments of various types c vegetation. A good and extensive index and bibliography are appended. *Subject Heading* **1. Bioclimatology 2. Ecoclimatology 3. Biochores 4. Climagrams.**—*M.R.*

POPULAR SCIENCE BOOKS

See also: **Laboratory manuals** (Crowell, Lutz), 9.9–37; **U. S. Antarctic program,** 9.9–43.

9.9–11 551.5(02

Lehr, Paul E.; Burnett, R. Will and Zim, Herbert S., **Weather: air masses, clouds, rain fall, storms, weather maps, climate.** New York, Simon and Schuster, 1957. (New ed Jan. **1958.** 160 p. 301 illus. in color, by Harry McNaught. 9 refs. (Golden Nature Guide "Third revised printing with corrections, designated by letter C on last line of index."—Th second (B) and third (C) printings of this most popular of elementary texts on weather a the same as the first printing (*see* 8.9–10, Sept. 1957, *MAB*) except for minor corrections. quarter of a million copies have by now been printed (the book is for sale in all drug stores an variety stores that carry "pocket" books). The colored illustrations (one to five per page are unusually well-chosen, effective, and up-to-date. The various sections treat schematicall and descriptively of clouds and rain or rain making, atmospheric structure, compositio circulating air masses, fronts, storms, climatology, weather maps, forecasting, books abou weather, numerical prediction charts, tornado warning, etc. A good index is appende *Subject Headings:* **1. Elementary meteorology 2. Popular meteorology textbooks.**—*M.R.*

9.9–12 535(023) 620.9:551.521.1

Cook, James Gordon, **We live by the sun.** N. Y., Dial Press, **1957.** 192 p. photos. LC (QC357.C63)—Popular science treatment of the phenomenon of light, the structure of e sun, astrophysical observatories, solar energy utilization by man, animals, insects, plants, ., and of light in photography (including color), fluorescence and fluorescent lighting, osphorescence, photosynthesis, optical phenomena of reflection, refraction, the zodiacal ht, sunspots, solar flares, solar cookers, furnaces and batteries, etc. *Subject Headings:* **Light 2. Solar energy utilization.**—*M.R.*

9.9–13 551.46(04)

Cook, James Gordon, **The world of water.** N. Y., Dial Press, **1957.** 192 p. photos. LC (GB661.C64)—A popular science book covering many aspects of water and its use on land d sea (but not in the air). The oceans, tides, waves, tidal power, chemicals and minerals m the sea, plant and animal life in the sea, fresh water from the sea, heavy water, erosion rain and streams and the necessity of water for life are the subjects of the several chapters. od illustrations and a subject index are included. *Subject Headings:* **1. Water 2. Popular eanography.**—*M.R.*

9.9–14 551.507.362.2:629.19:087.5

Lewellen, John Bryan, **The earth satellite: man's first true space adventure.** Foreword John P. Hagen. Illus. by Ida Scheib. N. Y., Alfred A. Knopf, **1957.** 59 p. Price: $2.25. LC (PZ10.L49ear)—A children's book giving the essence of our knowledge of artificial ellites and their uses: physical principles, trajectories, launching difficulties and future, fore one had actually been launched. The illustrations are accurate and effective and the nguage simple, direct, and detailed enough to inform more than to glamorize. *Subject adings:* **1. Satellite observatories 2. Juvenile science books.**—*M.R.*

9.9–15 551.5(08)

Spectorsky, Auguste C. (*ed.*), **The book of the sky: being a collection of writings about the y in all its aspects.** N. Y., Appleton-Century-Crofts, **1956.** 490 p. photos, illus. **DWB** 108 S841b)—A marvelous, illustrated collection of 91 essays or articles about balloon aero- utics, aviation, astronomy, meteorology, aerial warfare, floods and wonders of the heavens, y, clouds, aurora, etc. taken from ancient, medieval and modern literary sources. Out- nding pieces are the account of auroras in Alaska by JOHN MUIR, of a cloudburst by H. E. TES, a historic snowstorm (Feb. 20–24, 1717) by COTTON MATHER; floods in China by NE MORROW LINDBERG, etc. *Subject Heading:* **1. Meteorology in literature.**—*M.R.*

MONOGRAPHS AND COMPREHENSIVE PAPERS

See also: **Ionospheric drift meas. techniques** (Beynon, Brown), 9.9–29; **Ionospheric soundings** (Wright et al.), 9.9–30; **Energy exchange snowfield-atmos., Maudheim, Antarctica** (Liljequist), 9.9–42; **Typhoon analysis and damage, Macao** (Natario), 9.9–165; **Climate, Tunisia** (Preziosi), 9.9–221.

9.9–16 551.510.41

†*Junge, Christian E. (*U. S. A. F., Geophysics Res. Directorate, Cambridge Res. Center*), **mospheric chemistry.** *Advances in Geophysics*, N. Y., 4:1–108, **1958.** 31 figs., 21 tables, 2 refs., eqs. **DWB, DLC**—A systematic review of the major areas of current research into e chemistry of the atmosphere: 1) Aerosols: their size distribution, physical composition, ken particles, sea-salt aerosols and continental aerosols; 2) Rare atmos. gases: CO_2, O_3, O, NO, NO_2, NH_3, SO_2, H_2S, Cl, CH_4, CO, etc. and ratio of gaseous to particle matter; Precip. chemistry: removal of trace substances from atmos., wash out processes, rain water ntent of continental and of marine components, respectively; 4) Air pollution components d extent of influence of pollution around centers. Instruments, techniques, theory, basic ta on each phase (in tables and graphs), microphotographs, schematic diagrams, records, mulas and references, up to and including 1955, abound. Emphasis is on active ground el or tropospheric constituents, i.e., both natural and artificial trace substances of variable

quantity as contrasted with the rare permanent gases. *Subject Headings:* **1. Atmospheric chemistry 2. Trace elements in atmosphere.**—*M.R.*

9.9–17 551.594.51:01

†Chamberlain, Joseph W., **Theories of the aurora.** *Advances in Geophysics*, N. Y., 4:109–215, **1958.** 21 figs., 113 refs., numerous eqs. **DLC.** Also reprinted as Chicago. Univ. Yerkes Obs., Williams Bay, Wisc., Contract AF 19(122)-480, Technical Report, No. 40.—A major critical summary and review of current knowledge of auroral physics and theory. Historical and observational aspects comprise Ch. 1; The motions of charged particles in magnetic fields, Ch. 2; STÖRMER's theory, Ch. 3; Electric currents from sun to earth, 4; CHAPMAN-FERRARO theory and ring current, 5; ALFVÉN, HOYLE and LEBEDINSKIĬ's theory, 6; VESTINE and WULF's dynamo theory, SINGER's shock-wave theory, PARKER's theory of hydromagnetic displacement of lines of force, MARIS-HULBURT theory of UV-light and meteor theories, 7 and theories of auroral excitation, 8. *Subject Headings:* **1. Auroral theories 2. Auroral bibliographies. I. Chicago. Univ. Yerkes Obs., Williams Bay, Wisc. II. Contract AF 19(122)-480.**—*M.R.*

9.9–18 523.5

†*LaPaz, Lincoln (*Director, Inst. Meteoritics, U. of New Mexico*), **The effects of meteorites upon the earth (including its inhabitants, atmosphere, and satellites).** *Advances in Geophysics*, N. Y., 4:217–350, **1958.** 8 figs., 12 tables, 202 refs., 6 eqs. **DWB, DLC**—A most thorough and readable technical review of the subject of meteorites: (1) their effects on the earth's surface, the probability of their hitting the HTA (Human Target Area), BTA (Built-up Target Area) or VTA (Vehicular Target Area) is discussed; (2) a catalogue of types, weights and number of recovered meteorites; (3) abundance of meteorites in terrestrial spheres, rate of accretion of material, search and equipment for meteorites, associated phenomena (light strokes, noctilucent clouds, rainfall peaks, ionospheric layer); (4) hyperbolic velocity problem; radar, photographic and other methods of determining speeds; (5) frequency of falls as function of right ascension of moon (Catalog of 317 falls, according to lunar criteria); (6) crater producing falls (Arizona, Texas, etc.) and distinction between meteorites and shooting stars, which are never accompanied by meteor falls. *Subject Headings:* **1. Meteorite effects 2. Meteor craters 3. Meteorite frequencies.**—*M.R.*

9.9–19 551.501.45:519.

Holloway, J. Leith, Jr. (*U. S. W. B., Wash., D. C.*), **Smoothing and filtering of time series and space fields.** *Advances in Geophysics*, N. Y., 4:351–390, **1958.** 12 figs., 1 table, 20 refs., 11 eqs. **DWB, DLC**—The present extensive review article deals with theory and application of smoothing and filtering techniques to geophysical problems involving time series and space fields. The subjects covered in the 12 sections are: 1) general, 2) time smoothing and filtering, 3) equalization, pre-emphasis and inverse smoothing; 4) smoothing and filtering functions, 5) frequency response of smoothing functions, and other filters; 6) design of smoothing functions and filters with specified frequency response; 7) high-pass and band-pass filtering functions; 8) elementary smoothing and filtering functions; 9) design of inverse smoothing functions; 10) design of pre-emphasis filters; 11) filtering by means of derivation of time series; 12) space smoothing and filtering. An illustration is given for space-smoothed N. Hemisphere sea level pressure charts (Jan. 1, 4, 6 and 7, 1953), with an auxiliary chart showing observed minus space-smoothed isobars which compare with actual detailed weather maps we use daily. Other examples from meteorology are cited. *Subject Headings:* **1. Smoothing techniques 2. Filtering 3. Statistical techniques.**—*M.R.*

9.9–20 551.24

†Melchior, Paul J. (*Observatoire Royal de Belgique, Uccle, Brussels, Belgium*), **Earth tides.** *Advances in Geophysics*, N. Y., 4:391–443, **1958.** 12 figs., 8 tables, 35 refs., 10 eqs. **DWB, DLC**—A review of the theory and practical applications of various types of earth tides: static theory and methods of calculation; LOVE's numbers; analogy to ocean or lake tides; equipment and techniques for measuring periodical deflections of the vertical with respect to the crust

easurement of elastic tensions and cubic dilatations due to deformations caused by tides; eflections of vertical with respect to axis of earth; variations of intensity of gravity measured y several methods; role of geologic structure of the crust, of ocean and atmospheric tides or essure changes, theory of elastic deformations of the earth; effect of earth tides on speed of tation of the earth and, finally, the IGY program for investigating earth tides. *Subject eadings:* **1. Earth tides 2. Atmospheric effects on earth tides 3. IGY earth tide program.** *-M.R.*

9.9–21 551.582.1(729) 551.585.5

†*Lahey, James F., **On the origin of the dry climate in Northern South America and the outhern Caribbean.** Wisconsin. Univ. Dept. of Meteorology, Contract AF 19(604)-992, cientific Report, No. 10, Feb. **1958.** 290 p. figs., diagrs., photos, 3 maps (fold.), tables, ot-refs., bibliog. (105 refs.) **DWB**—An extensive study (submitted as a doctoral dissertation y the author) of broad weather singularities in the Caribbean, and in Northern South America, ecifically in the Southern Caribbean dry zone. The causes of this dry condition are studied, nd previous suggestions critically reviewed (i.e., the cold water hypothesis, the atmospheric otions and the topographic explanation). Frequency of rain in separate months, evaporation, ind and upper air data of all kinds are analyzed and shown graphically on maps, etc., and in bles to present a complete climatology of the region. *Subject Headings:* **1. Climatology of aribbean dry zone 2. Singularities in circulation pattern 3. Northern South America Caribbean.**—*M.R.*

9.9–22 551.509.617:551.576

Thom, H. C. S., **An evaluation of a series of orographic cloud seeding operations.** *U. S. dvisory Committee on Weather Control, Technical Report,* No. 2, June **1957.** 79 p. 5 figs., tables, 17 refs., 8 eqs. (Also included in its **Final Report,** Vol. 2:25–50, **1957.**) **DWB.** lso issued in summary form in Conference on the Scientific Basis of Weather Modification udies, Univ. of Arizona, Tucson, April 1956, **Proceedings,** pub. **1956.** 2 p. And also sued separately, in mimeographed form (summary), with 4 figs. **DWB**—Evaluations on series of 11 projects in the United States and one in France are undertaken. On the basis past work, it is hypothesized that these should be divided into three classes; 5 orographic, semi-orographic, and 4 non-orographic. The orographic and semi-orographic classes, cluding the French project, are also combined into a West Coast class with 7 projects. eteorological analysis predicts that artificial nucleation would be effective in augmenting ecipitation in orographic and West Coast classes but not in the non-orographic class. The sults presented are consistent with this hypothesis. The orographic project class and the est Coast class both showed increases of 14% in precipitation which are both significant the 0.01 level of probability. The non-orographic projects showed no significant increase. he evaluations comprised 5096 storms of historical record used in estimating 59 regression nes. These were used as bases for comparison with precipitation amounts from 386 seeded orms for the tests of significance and the determination of percentage increases. A worked it example of an evaluation for one month of storms is given in complete detail in the ap- ndix. *Subject Headings:* **1. Cloud seeding of orographic clouds 2. Orographic clouds Cloud seeding evaluation 4. France 5. United States.**—*Author's abstract.*

9.9–23 551.509.617:551.578.7

Thom, H. C. S., **A method for the evaluation of hail suppression.** *U. S. Advisory Committee on Weather Control, Technical Report,* No. 4, June **1957.** 42 p. 4 figs., 5 tables, 12 refs., eqs. (Also included in its **Final Report,** Vol. 2:55–69, **1957.**) **DWB.** Also in: *Zeitschrift r angewandte Mathematik und Physik,* Basel, 9(1):37–63, Jan. **1958. DLC**—A sequential st of hypothesis is developed for testing the hypothesis that hail suppression operations duce the frequency of hail-days. This is applied to the data provided by suppression trials er the Magadino Plain in Switzerland. Operating characteristic and average sample mber functions are also developed and applied to hail data from the Magadino Plain. plications of the methods and test results are discussed. *Subject Headings:* **1. Hail suppression 2. Hail shooting 3. Magadino Plain, Switzerland.**—*Author's abstract.*

9.9–24 551.509.617:519.2

Thom, H. C. S., **Statistical method of evaluating augmentation of precipitation by clou seeding.** *U. S. Advisory Committee on Weather Control, Technical Report*, No. 1, June 195 62 p. 16 figs., 41 refs., numerous eqs. (Also included in its **Final Report,** Vol. 2:5–25, 1957 **DWB**—The general features of the regression methods of evaluation as they apply to targe control systems are discussed. Application of these requires that the residuals from regressio have a constant variance for all values of control precipitation. Since raw precipitation dat do not result in such regressions, a parametric transformation which transforms target an control precipitation to normality and stabilizes the residual variance is developed. Th parametric character of the transformation facilitates the making of stochastic models hypothetical evaluations and thus to perform experimental sampling on artificial precipitatio data. This leads to certain inferences concerning previous evaluations and requirements fo future evaluations. The simple theory of testing hypothesis is discussed with applicatio to a hypothetical sample of storms. The evaluation method is then extended to multipl seedings and applied to an artificial sample of storms. Power curves are developed for multip seedings for several assumed percentage increases. Transformation of hydrologic data discussed and a method applicable to such data developed. *Subject Headings:* **1. Cloud seedin evaluation 2. Regression techniques.**—*Author's abstract.*

9.9–25 551.524.34:551.506.3 (49

Sneyers, R., **Sur quelques propriétés statistiques de la température de l'air en Belgiqu** [Some statistical properties of the air temperature in Belgium.] *Belgium. Institut Roy Météorologique, Publications, Ser. A*, Nov. 4, 1956. 62 p. figs., 9 tables, 18 refs. **DWB** Conditions under which observations were made at Brussels and Uccle from 1833–1953 a outlined, methods of homogenizing, smoothing, averaging, determining daily means, etc set forth and illustrated graphically; the long period records for 5 year means for 1840–19 for Uccle and 5 other European stations are shown graphically, with upward trend evide throughout century at Uccle and 1890–1930 or 1950 at other stations (Paris, Greenwich, D Bilt, Cleve and Frankfurt). Monthly trends in mean maximum and minimum and man other aspects of the temperature regime at Uccle are treated by rigorous statistical method Finally, numerous charts for Belgium show departures and other statistical parameter *Subject Headings:* **1. Temperature statistics for Belgium 2. Secular trends in temperatu 3. Uccle, Belgium 4. Belgium.**—*M.R.*

9.9–26 551.543.3:551.513.7:551.509.33 (91

*†Berlage, H. P., **Schommelingen van de algemene luchtcirculatie met perioden van me dan een jaar, hun aard en betekenis voor de weersverwachting op lange termijn.** [Fluctua tions of the general atmospheric circulation of more than one year, their nature and prognost value.] *Netherlands. Meteorologisch Instituut, Mededelingen en Verhandelingen*, No. 6 **1957.** 152 p. 35 figs., 33 tables, 194+ refs., 30 eqs. **DWB, DLC**—The Southern Oscillatio (Sir Gilbert Walker) is examined in its many aspects, on the basis of hundreds of previou empirical works on long range (seasonal) forecasting from pressure cycles and space-tim correlations between pressures, sea temperatures, general circulation indices and solar event The approach is quantitative and highly critical, e.g., in the first chapter (Empirical period >1 year and their significance) the fact is brought out that periods of whole years or fractio from 1 to 25 years show up with no gaps—making them almost useless in forecasting, and tha by reinforcement, or "beating," all sorts of other periods may be cooked up or used to explai past weather. However, a 7-year cycle in Indo-Pacific air pressure and tree-ring widt seem to be the most promising for the East Indies. Ch. 2 goes into the Southern Oscillatio Fundamental (facts, theory, correlation charts, extreme years, and precip.). Ch. 3 dea with the normalization, propagation and extension, east and west periods, relations wit fluctuations in solar activity, and the effect of volcanic dust (e.g., 1913) on the operation the long period Southern Oscillation; Ch. 4 evaluates the long period oscillations with respe to forecasting (by extrapolation of sunspot numbers, lag correlations, etc.) and Ch. 5 giv corrected tables of air pressure at: 1) Juan Fernandez, 2) Mauritius 3) Ocean Island and Paramaribo. Ch. 6 consists of an alphabetical author bibliography of 1350 references. E tensive tabulations of data, graphs and other illustrative material are included. These da

ave been obtained from various parts of the earth. A connection with the North Atlantic or Arctic) oscillation is suspected and recommended study of the global oscillation outlined. *ubject Headings:* **1. Seasonal forecasting from periodicities 2. Southern Oscillation 3. East ndies.**—*M.R.*

9.9–27 551.515.3:312.2

*†Linehan, Urban J., **Tornado deaths in the United States.** *U. S. Weather Bureau, Technical aper*, No. 30, March **1957.** 48 p. 2 figs., 16 tables, 35 refs. (20 charts at end). **DWB.** lso: reprint from *Dissertation Abstracts*, Ann Arbor, Mich., 15(10), **1955.** (4 p.) Microfilm opy of complete manuscript of 491 p. available from University Microfilms, Ann Arbor, lich. Price: $6.14. Enlargements 6″×8″, $.10 per page.—Data on tornado deaths and eath days for all parts of the U. S. taken from U. S. W. B. for 38 yrs (1916–53) are analyzed nd the analyses presented in tables, graphs, maps, etc. and discussed in the text with respect o hourly, monthly, annual and regional variations. Separate maps of U. S. show by dates ne deaths during each month. Seasonal shift in regions of greatest danger are also shown n maps. March–June accounts for $\frac{4}{5}$ of the 8700 deaths and March–April for 53%. Sixty % deaths occurred in first half of 38 years; 40% in last half, and 3 out of 4 occurred between :30 p.m. and 9:30 p.m. Population factors are considered throughout. *Subject Headings:* **. Tornado deaths 2. United States.**—*M.R.*

MANUALS, ATLASES AND HANDBOOKS

See also: **Netherlands participation in IGY,** 9.9–44; **Aeromet. training manuals,** 9.9–76.

9.9–28 551.510.535:621.396.8

Piggott, W. R.; Beynon, W. J. G.; Brown, G. M. and Little, C. G. (*comps.*), **Measurement f ionospheric absorption.** *International Geophysical Year, 1957/1958, Annals, 3(IGY Instruction Manual)*:173–226, **1957.** figs., tables, refs., eqs. Contents: **General theory of onospheric absorption,** p. 177–178. Piggott, W. R.; Beynon, W. J. G. and Brown, G. M.: **he pulse reflection method of measuring ionospheric absorption,** p. 179–203. **Ionospheric bsorption and f-min,** p. 204–206. Little, C. G.: **The measurement of ionospheric absorption sing extra-terrestrial radio waves,** p. 207–217. **Brief report on some absorption intercomparison experiments,** p. 218–226. **DWB**—A systematic and thorough treatment of theory nd practice in measurement of ionospheric absorption in general and for IGY in particular. he methods involve study of variations in amplitudes of signals, in minimum frequency of choes from the ionosphere and variations in amplitudes of signals from outside the atmos. uring IGY the geographical variations, solar relations, winter anomalies, corpuscular effects, tc. will be studied. Appendices give symbols, abbreviations and terminology used in absorption measurements, and detailed program for pulse reflection absorption measurements during GY (frequencies, sampling, noon and night observations, diurnal variations, measurement f constant solar zenith angle and high latitude measurements). *Subject Headings:* **1. Ionospheric bsorption measurement techniques 2. Ionospheric absorption equipment 3. IGY ionospheric program.**—*M.R.*

9.9–29 551.557:551.510.535

Beynon, W. J. G. and Brown, G. M. (*ed.*), **Measurement of ionospheric drifts.** *International Geophysical Year, 1957/1958, Annals, 3(IGY Instruction Manual)*:231–287, **1957.** gs., tables, refs., eqs. Contents: Briggs, B. H.: **The determination of ionospheric-drift elocities from three-receiver fading records,** p. 235–249. Huxley, L. G. H. and Greenhow, . S.: **The investigation of winds in the upper atmosphere by means of drifting meteor trails,** . 250–274. **Brief summary of other techniques for measuring ionospheric drifts,** p. 275–279. **ome comparisons of drift observations and techniques,** p. 280–283. References, p. 284–285. **WB**—A complete and systematic treatment of theory and practice of ionospheric drift easurement. Different methods (and the equipment analysis of records and results obained to date) are outlined. 3-receiver fading technique, drifting meteor trail studies, oherent pulse method, vertical incidence, ionogram comparison, radio star observation, movement of noctilucent clouds, airglow luminosity changes, auroral drifts, etc. are described.

Appendices cover the symbols to be used in recording ionospheric drifts and the IGY progra is outlined. *Subject Headings:* **1. Ionospheric drift measurement techniques 2. IGY iono spheric program.**—*M.R.*

9.9–30 551.510.535(02

Wright, J. W.; Knecht, R. W. and Davies, K. (*comps.*), **Ionospheric vertical soundings** *International Geophysical Year, 1957/1958, Annals, 3(IGY Instruction Manual)*:1–167, **1957** 157 figs. (incl. forms), 21 refs., tables. **DWB**—This profusely illustrated volume contains thorough and systematic treatment of vertical sounding theory and techniques prepared b members of the Boulder Laboratories of the U. S. National Bureau of Standards. It present the history of ionospheric research in polar years, the present IGY program which involve observations at 150 stations; ionospheric physics (structure, wave propagation, effect o magnetic field, absorption, scattering, variations of ionosphere, oblique incidence propagation true height analysis); sounding equipment (pulse measurements, ionosondes and their adjust ment, use, antennas and photo-processing of records); interpretation of ionograms: selectio of trace, identification of layers, interpolation difficulties (spread echo, E_s, middle and lo latitude problems); reduction of ionograms: scaling, tabulation of data and statistical methods and data quality. Appendices give schedules, suggestions for punch cards and research, etc *Subject Headings:* **1. Ionospheric soundings 2. IGY ionospheric program 3. Ionospheri manuals.**—*M.R.*

9.9–31 551.501.8:551.510.62(02

Beynon, W. J. G. and Brown, G. M. (*eds.*), **Miscellaneous radio measurements.** *Inter national Geophysical Year, 1957/1958, Annals, 3(IGY Instruction Manual)*:293–381, **1957** figs., tables, refs., eqs. Contents: Horner, F.: **The measurement of atmospheric radio noise** p. 295–314. Morgan, M. G.: **Whistlers and dawn chorus,** p. 315–336. Lovell, A. C. B. Forsyth, P. A. and Harang, L.: **Radio reflections from aurorae,** p. 337–341. Lovell, A. C. B. **Apparatus for radio-echo meteor survey,** p. 342–345. Bowles, K. L.: **Ionospheric forwar scatter,** p. 346–360. Peterson, A. M.: **Ionospheric back scatter,** p. 361–381. **DWB**—Thi manual gives a thorough treatment of all aspects of measurement of atmospheric radio nois (theory, equipment, observation methods, collection of data in centers, etc.), sferics, tweeks whistlers, the dawn chorus, multiple whistlers, radio reflections from auroras, radio meteo surveys and ionospheric scatter (forward and backward) for use in IGY program. Sample of observation forms and records, and elegant photos of equipment are included. *Subje Headings:* **1. Radio noise measurement techniques 2. Whistler measurement technique 3. Dawn chorus 4. Tweeks 5. Radio reflections from auroras 6. Radio meteor survey 7. Ionospheric scattering.**—*M.R.*

9.9–32 551.510.535(02

Beynon, W. J. G. and Brown, G. M. (*eds.*), **IGY instruction manual: the ionosphere** *International Geophysical Year, 1957/1958, Annals*, Vol. 3, **1957.** 1 vol. bd. in 2, continuousl paged. illus., tables, refs., eqs. **DWB**—The ionosphere instruction manuals for IGY, 1957/5 are divided into 4 main parts or 2 volumes. Vol. I contains detailed instructions for vertical incidence soundings (Pt. I) and Vol. II contains the other 3 parts and is devoted to absorptio measurements (Pt. II); drift measurements (Pt. III) and miscellaneous radio measurement (atmos. radio noise, whistlers, the dawn chorus, radio reflections from aurora or meteors an ionospheric scatter) Pt. IV. Not only instructions but basic knowledge of each subject i covered. Pt. I was prepared by the National Bureau of Standards at Boulder, Colo. Eac section contains several articles written by authorities in the particular field. For listing o contents, *see* p. 636, May 1958, *MAB.* Articles separately abstracted. *Subject Heading* **1. Ionospheric manuals 2. IGY manuals. I. International Geophysical Year, 1957/1958 Special Committee II. International Council of Scientific Unions III. U. S. National Bureau of Standards.**—*M.R.*

9.9–33 523.74:551.590.21(02) 551.510.72

International Geophysical Year, 1957/1958, **Annals, Vol. 5 (IGY Instruction Manual) Pt. 4, 5, and 6.** London, Pergamon Press, **1958.** p. 251–468. figs., tables, bibliogs. **DWB**—

is publication contains 3 parts of Vol. 5 of the *Annals*, comprising the IGY instruction nuals for observing solar activity (Pt. 4); radioactive fallout (Pt. 5); and radiation (direct, ort and long wave), including instruments, observations, reduction of records and pres- tation of data, respectively (Pt. 6). Pt. 5 contains 12 papers presented at the meeting of e CSAGI working group on nuclear radiation in Utrecht, Jan. 22–26, 1957, on atmospheric dioactivity, fallout measurement, uses of radioactive tracers in general circulation or hydro- gic studies, and other uses in meteorology. For listing of contents, see Pt. III of this issue. ticles abstracted separately. *Subject Headings:* **1. Solar activity observations 2. Radioactive llout measurement 3. Radioactive tracers in meteorology 4. Radiation observations Radiation instruments 6. IGY manuals.**—*M.R.*

9.9–34 551.578.46(02)

Handl, Leo, **Praktische Schnee- und Lawinenkunde.** [Practical snow and avalanche ience.] Innsbruck, Wagner'sche Univ.-Buchhandlung, **1955.** 56 p. 16 figs., glossary, 45–54. **DWB** (M78.46 H236pra)—A practical manual containing information and many nematic drawings on snow and snow research, snow crystals, snow cover (mechanics, struc- re), wind effects, firn, avalanches, snow sampling or observation, metamorphosis, examples avalanches (e.g., Jan. 21, 1951), ski-warning and safety hints or rules, avalanche warning d protection, artificial avalanche release and, finally, a long snow and avalanche glossary n German). The treatment is technical, from an engineering rather than a mathematical int of view, and descriptive in the main. *Subject Headings:* **1. Snow and avalanche manuals Snow glossaries 3. Avalanche warning.**—*M.R.*

9.9–35 551.542:551.509.22

§Lahey, James F.; Bryson, Reid A. and Wahl, Eberhard W., **Atlas of five-day normal sea- vel pressure charts for the Northern Hemisphere.** Wisconsin. Univ. Dept. of Meteorology, ntract AF 19(604)-992, Scientific Report No. 7, **1958.** 1 p. of text. ref. charts. 24×60 n. **DWB.** Also: Lahey, James F.; Bryson, Reid A.; Wahl, Eberhard W., Horn, Lyle H. d Henderson, Vilas D., **Atlas of 500 mb wind characteristics for the Northern Hemisphere.** isconson. Univ. Dept. of Meteorology, Contract AF 19(604)-2278, Scientific Report, o. 1; Contract AF 19(604):992, Scientific Report No. 9, **1958.** 1 page of text. charts. **DWB** These two atlases contain (I) Normal sea-level N. Hemisphere pressure, standard deviation sea-level pressure and pressure change from one 5-day period to the next, for each 5-day riod from Jan. 1–5 to Dec. 27–31, based on the Daily Series of N.H.S.L. charts of the S. W. B. for 20 yrs (1907–13 and 1925–37); and (II) N. Hemisphere charts of 1) resultant onthly wind speed, and direction at selected grid points, 2) monthly mean geostrophic west- st components, 3) standard deviation of west-east component, 4) and 5) same for north- uth component; 6) monthly mean 500 mb heights, in feet and 7) standard deviation of 500 b heights. Thus, 7 full size charts appear for each month. The cartography in both atlases excellent—it is too bad the two were not made of uniform size, for the pressure atlas is long d skinny and the wind atlas square. *Subject Headings:* **1. Northern Hemisphere pressure arts 2. Northern Hemisphere.**—*M.R.*

9.9–36 551.501.4:551.46

†*Zubov, Nikolaĭ Nikolaevich, **Okeanologicheskie tablitsy.** [Oceanographical tables.] l ed. Leningrad, Gidromet. Izd-vo, **1957.** 405 p. 227 tables, 120 refs. **DLC** (GC51.Z79) Oceanographic tables were published in 1931 for the 2nd International Polar Year (1932–33) d these were revised and enlarged in 1940. The present set of tables in book form, is intended r use in IGY work. A score of workers collaborated in preparing the separate chapters. he general subjects of the tables are: (I) oceanographical tables: A) thermometric and bathy- etric tables, B) tables for calculating density and density currents, C) for stability (lapse tes), D) for adiabatic corrections, E) sound propagation, F) tide tables, G) wave tables,) conversion tables for dynamic oceanography, I) drift current navigation tables; (II) hydro- ysical tables; (III) Sea ice tables; (IV) Marine meteorological tables (33 tables); (V) Hydro- emical tables; (VI) Marine geology tables; (VII) Astronomical, geophysical and cartographic bles; (VIII) Conversion tables; (IX) Mathematical tables. A good bibliography is ap- nded. *Subject Headings:* **1. Oceanographic tables 2. Computation tables.**—*M.R.*

9.9–37 55(02)

†Crowell, Victor L. and Lutz, Alan (*both, State Teachers College, Trenton, N. J.*), **A laboratory manual for earth science survey: astronomy, geology and meteorology.** Minneapolis: Burgess Pub. Co., **1956.** 103 p. figs., forms, 64 refs. Review by Jerome Spar in *American Meteorological Society, Bulletin*, 38(9):559, Nov. **1957.**—The manual for laboratory experiments and demonstrations in: A) Astronomy, G) Geology and M) Meteorology. The Astronomy section deals with construction and use of a sundial, a star clock, time and latitude and longitude determination on the globe, the planets, etc. The Geology section deals with the atmosphere, hydrosphere and weathering, minerals and rocks, and topographic maps. The Meteorology section takes up the reading of instrument scales, dewpoint, relative humidity, air pressure, map analysis, climate of the U. S., etc. Sample climatic and synoptic charts of the U. S. are included in pocket. The material is intended for use in teachers' colleges but the elementary nature of much of the suggested work indicates that it is mainly to give ideas to teachers of grade school children. *Subject Headings:* **1. Laboratory manuals 2. Earth science** —*M.R.*

GENERAL GEOPHYSICS AND METEOROLOGY

GEOPHYSICS

See: **Advances in Geophysics** (Landsberg, ed.), 9.9–2; **Earth tides** (Melchior), 9.9–20.

GEOMAGNETISM

See: **IGY geomagnetic networks** (Roberts, Knapp), 9.9–50.

ARCTIC RESEARCH

See also: **Glaciers, Baffin Island** (Baird et al.), 9.9–41; **Engineering climatology, Alaska** (Potter), 9.9–93; **Temp. gradient, Greenland Ice Cap,** 9.9–194; **Frozen soil meas. and instruments, N. Alaska** (Lachenbruch), 9.9–200; **Potential evapotranspiration, Canadian Arctic** (Sanderson), 9.9–223; **Arctic sea smoke, Queensland** (Whittingham), 9.9–244; **Deformation of granular snow, Greenland** (Landauer), 9.9–267.

9.9–38 551.507.2:551.506.5(988)

Weiss, Gottfried, **Das arktische Jahr. Eine Überwinterung in Nordostgrönland.** [The Arctic year. One winter in northeast Greenland.] Braunschweig, Georg Westermann, **1949.** 162 p. illus., diagr., map. **DLC**—A cleverly illustrated popular account of the experiences of a German party of meteorologists who wintered on a ship and finally at a shore station established on Sabine Island (lat. 75°N) on the east coast of Greenland. The author was one of the observers and a forecaster, who made a survey trip by plane in July 1942 from Trondheim, Norway, to the coast of Greenland and back in 15 hrs. The ship "Sachsen" which was equipped for weather observations, left Kiel in August 1942, arriving at Sabine Island in 1942. The author left by plane on June 17, 1943. His replacement was captured 40 days later by the Americans, and the author himself in 1944 while attempting to return to Greenland. This account vividly describes storms, auroras, release of pilot and radiosonde balloons, 3-hourly observations, construction of facilities and exposure of instruments, and other phases of life and activities at a polar station. *Subject Headings:* **1. Arctic weather stations 2. Expeditions 3. Weather ships 4. Greenland 5. Sabine Island. I. Kubbernuss, Walter** (*illus.*).—*M.R.*

9.9–39 551.582.3:551.506.5(988)

*Hamilton, R. A. and Rollitt, G., **Climatological tables for the site of the Expedition's base at Britannia SØ and the Station on the inland-ice "Northice."** *Denmark. Kommissionen for Videnskapelige Undersøgelser i Grønland, Meddelelser om Grønland*, 158(2), **1957.** 83 p. 3 figs., 19 tables. On t-p: British North Greenland Expedition, 1952–1954. **DWB** (P M488) **DLC** (Q115.D39)—This paper consists mainly of climatological tables compiled from the meteorological observations made by the British North Greenland Expedition 1952–54 over a period of about 20 months at the two stations Britannia Sø (approx. 77°N, 23°W, alt. 231 m) and at "Northice" (approx. 78°N, 39°W, alt. 2345 m). A general description is made of the

site of the meteorological stations and of the surrounding topography. The tables for each meteorological element are accompanied by a brief description of the instruments used, the methods of calibration, corrections applied, etc. The tables include monthly means of the following meteorological elements: wind speed, temperature at each synoptic hour, maximum and minimum temperatures, relative humidity and vapor pressure, pressure at station level, amounts of cloud and low cloud at the synoptic hours. The extreme values of temperature, pressure, relative humidity and vapor pressure, pressure at station level, amounts of cloud and low cloud at the synoptic hours. The extreme values of temperature, pressure, relative humidity and vapor pressure are also given. For each month is given the total precipitation, the number of days of rain, snow and gale. The frequency tables show the diurnal variation of wind, cloud amount and visibility, the variation of wind speed with direction, the frequency of maximum temperature, minimum temperature and wind chill in certain ranges and the variation of the state of ground. *Subject Headings:* **1. Climatic charts 2. North Greenland. I. British North Greenland Expedition, 1952–1954.**—*Authors' abstract.*

9.9–40 551.583:581.056(211.1)

Giddings, J. L., Jr. (*Univ. of Penna., Philadelphia*), **Tree-ring dating in the American Arctic.** *Tree-Ring Bulletin*, 20(3/4):23–25, Jan./April **1954. DWB**—Suitable trees near Arctic tree limit record July temperatures. Cross-dating shows some similarity over whole American zone with local exceptions. Wood from archaeological sites extends record back to 978 A.D. Driftwood gives evidence of dated sea currents. *Subject Headings:* **1. Tree ring growth 2. American Arctic.**—*C.E.P.B.*

9.9–41 551.311.12/14

Baird, P. D., Ward, W. H., and Orvig, S., **The glaciological studies of the Baffin Island expedition, 1950.** *Journal of Glaciology*, 2(11):2–23, March **1952.** figs., photos, 4 tables, 7 refs. English and French summaries, p. 2, 9. **DWB—Pt. 1, Method of nourishment of the Barnes ice cap,** by P. D. Baird, p. 2–9; **Pt. 2, The physics of deglaciation in Central Baffin Island,** by W. H. Ward, p. 9–22; Appendix, **Moraine plant succession at the edge of the ice cap,** by Mason E. Hale, p. 22–23. BAIRD concludes that the Barnes inland ice cap, 70°N, area 6000 sq km is maintained almost in equilibrium by immediate refreezing of summer melt water ("Baffin type"). Sections show depths of snow and temperature (unexpectedly low) in ice. Arctic ice caps are regarded as survivals from before post-glacial climatic optimum. WARD points out that owing to low temperature there is little or no melting at ice base and the debris forms ablation moraines. From botanical evidence HALE finds that last stable position of ice edge occurred in 1860± 10, followed by retreat at about 3 m/yr. *Subject Headings:* **1. Glaciers 2. Baffin Island. I. Hale, Mason E.**—*C.E.P.B.*

ANTARCTIC RESEARCH

See also: **Antarctic met.** (van Rooy), 9.9–1; **U. S. participation in IGY,** 9.9–46; **Solar radiation meas., Mawson, Ant.** (Albrecht, Dingle), 9.9–173; **Climate of Kerguelen Island** (Genty), 9.9–280.

9.9–42 551.511:551.578.46 551.521

*†Liljequist, G. H., **Energy exchange of an Antarctic snowfield.** *Norwegian-British-Swedish Antarctic Expedition, 1949–1952, Scientific Results*, Vol. 2, Pt. 1, pub. Oslo, Norsk Polarinstituut. (Section) A, **Short-wave radiation** (Maudheim, 71°03′S, 10°56′W), pub. **1956.** 109 p. 54 figs., 35 tables, 71 refs., eqs., 4 plates. (Section) B, **Long-wave radiation and radiation balance** (Maudheim, etc.), pub. **1956.** p. 113–183. 31 figs., 35 tables, 31 refs. (Section) C, **Wind structure in the low layer** (Maudheim, etc.), pub. **1957.** p. 187–233. 27 figs., 14 tables, 30 refs. (Section) D, **Surface inversions and turbulent heat transfer** (Maudheim, etc.), pub. **1957.** p. 237–298. 46 figs., 8 tables, 16 refs. **DWB**—The 4 present parts of the magnificently planned and executed expedition reports on the various elements of the energy exchange of the Antarctic at Maudheim, planned by AHLMANN and directed by SVERDRUP, represent one of the outstanding contributions to the comprehensive knowledge of radiation and heat balance in the polar regions or over shelf ice, or both. In Pt. (1) A, the

direct solar radiation, sunshine duration, global radiation, albedo, and penetration into the snow are treated systematically and in detail. In Pt. (1) B the long wave radiation, its measurement, characteristics, frequencies, clear-sky and wind speed relations, upper air temperature (inversion, etc.) relations, atmospheric long-wave radiative R_A, with clear and cloudy sky, low, middle and high clouds, etc., annual and diurnal variations of net long-wave radiation and radiative balance of the snow surface (annual, summer, and clear-calm conditions); Pt. (1) C takes up wind structure near the ground: instruments and methods, wind structure with neutral stability and in stratified (inversion) conditions, eddy viscosity, shearing stress, visibility with drifting snow, energy exchange in the dark, turbulent transfer of heat, Richardson number, etc.; Pt. (1) D goes into detail regarding surface inversions and turbulent heat transfer, instruments and methods, errors, thermometer lag, characteristics of surface inversions (structure, etc.) under typical and under special weather conditions; annual variation of inversion, frequency distribution of temp. gradient at surface, diurnal and annual variations, heat conducted to snow surfaces by turbulence in stable and actual weather conditions, both below freezing and with melting snow. Finally, the energy exchange of the snow surface is summarized. Scores of charts, graphs, diagrams, tables and a bibliography accompany each part of this work. *Subject Headings:* **1. Energy exchange snowfield-atmosphere 2. Maudheim Expedition, 1949–52 3. Maudheim, Antarctic. I. Norwegian-British-Swedish Antarctic Expedition, 1949–1952.**—*M.R.*

9.9–43 91.04(99) 92

Compelling continent. *Time*, N. Y., 68(27):12–19, Dec. 31, **1956.** 2 figs., 7 photos. **DLC**—A feature article on the current U. S. Antarctic operations and especially the role of Paul Siple (shown on the cover of the issue), the man who has spent more time in the Antarctic than anyone else (6 expeditions involving 5½ years on the continent between 1928 and 1958), and the man in charge of the S. Pole station for IGY. The 10 major expeditions to Antarctica (1772–1935) are shown on one colored chart, and the IGY stations proposed for 1957/58 on another. Problems of the 1956 operations (under Admiral Dubek) to establish the S. Pole station and the life of Paul Siple, the difficulties of Antarctic life, etc. are vividly summarized in this illustrated article. *Subject Headings:* **1. U. S. Antarctic program 2. Antarctic expeditions 3. Antarctic stations 4. Biography of Paul Siple 5. Siple, Paul.**—*M.R.*

IGY

See also: **Meas. of Ionospheric absorption** (Piggott et al.), 9.9–28; **Ionospheric drift meas. techniques** (Beynon, Brown), 9.9–29; **Ionospheric soundings** (Wright et al.), 9.9–30; **Radio noise meas. techniques** (Beynon, Brown), 9.9–31; **Ionospheric manuals** (Beynon, Brown), 9.9–32; **IGY instruction manuals,** 9.9–33; **Astrophysical terminology** (Ashbrook et al.), 9.9–66; **Oceanog. cruises, Gulf of Mexico,** 9.9–67.

9.9–44 550.3:061.3(02)

Netherlands. Meteorologisch Instituut, **Het Internationaal Geophysisch jaar, 1957–1958.** [International Geophysical Year, 1957/1958.] Its *Verspreide Opstellen*, No. 4, **1957.** 79 p. figs., photos. Contents: Vening Meinesz, F. A.: **Algemene inleiding** [Introduction], p. 7–16; Bleeker, W.: **Het budget van de dampkring,** [Atmospheric budget], p. 17–23; Groen, P.: **Het onderzoek van de wereldzee,** [Oceanographic research], p. 25–31; Veldkamp, J.: **De hoogste luchtlagen,** [The upper layers of the atmosphere], p. 33–41; Minnaert, M. G. J.: **De waarneming van de zon,** [Solar observations], p. 43–48; Jongen, H. F.: **De kosmische straling,** [Cosmic rays], p. 49–55; De Voogt, A. H.: **Het radio-verkeer in het Internationaal Geophysisch Jaar,** [Radio propagation], p. 57–63; Roelofs, R.: **Aarde, maan en sterren,** [The earth, moon and stars], p. 65–70; Oort, J. H.: **Kunstmatige satellieten.** [Artificial satellites], p. 71–79. **DWB**—This attractive brochure consists of 9 articles on different phases of the IGY, with frequent reference to participation by the Netherlands. The preface is by C. J. Warners, director of the KNMI (Netherlands Meteorological Service). The illustrations vividly depict various IGY activities. *Subject Headings:* **1. International Geophysical Year, 1957–1958 2. Netherlands participation in IGY. I. Vening Meinesz, F. A. II. Bleeker, W. III. Groen, P. IV. Veldkamp, J. V. Minnaert, M. G. J. VI. Jongen, H. F. VII. De Voogt, A. H. VIII. Roelofs, R. IX. Oort, J. H. X. Warners, C. J.**—*M.R.*

9.9–45 550.3:061.3(410)

International Geophysical Year, 1957–1958. British National Committee, **The United Kingdom contribution to the International Geophysical Year, 1957–58.** London, Royal Society, June **1957.** 72 p. 20 tables, 7 figs., photo. Glossary of technical abbreviations, p. 71–72. **DWB** (551.05 I613un)—Photo shows 14 members of the British National Committee for IGY, including SIR GRAHAM SUTTON, STAGG, WORDIE, BRUNT, DEACON, PATON and SIR HAROLD SPENCER JONES (Editor). The book gives an historical introduction, U.K. organization, and program in 15 different fields, the geographical distribution of U.K. stations, and an account of the establishment of Royal Society base at Halley Bay, Antarctica. A glossary of technical abbreviations is appended. Many indexes of stations, tables, charts and maps of stations are included. *Subject Headings:* **1. British participation in IGY 2. IGY program 3. United Kingdom.**—*M.R.*

9.9–46 551.506.22:550.3:061.3

International Geophysical Year, 1957/1958. U. S. National Committee, **Antarctic program.** *National Academy of Sciences—National Research Council, Publication*, No. 553, Sept. **1957.** 58 p. 17 plates, photos, 13 tables. **DWB**—This monograph gives a list (and map) of U. S. IGY stations in the Antarctic, a summary of activities in 10 fields, plus special studies undertaken. A summarization of scientific and support personnel in each discipline and of each type at each station, station facilities and equipment, communications by land, sea, air and radio, timetable of operations for 1954–5, 1955–6, 1956–7 and 1957–8, etc. is included. Station layouts at 7 places, buildings, site plans and photographs of stations and facilities are shown graphically. *Subject Headings:* **1. U. S. participation in IGY 2. IGY Antarctic program 3. IGY Antarctic stations.**—*M.R.*

9.9–47 551.501.1:551.594.5

Nicolet, M., **Instructions pour l'observation visuelle des aurores au cours de l'Année Géophysique Internationale.** [Instructions for the visual observation of auroras during the International Geophysical Year.] *Ciel et Terre*, Brussels, 73(11/12):527–545, Nov./Dec. **1957.** 10 figs., table. **DLC**—Instructions to voluntary observers who will participate in the global network of auroral observation. This note contains illustrated descriptions of the principal auroral forms, directions to those observers able to make hourly observations and to those who cannot follow such a strict schedule and, finally, instructions for detailed observation of the important auroral phenomena. The observation should particularly comprise the form, height, direction, color, brightness and activity of the aurora. *Subject Headings:* **1. Auroral observation program 2. IGY auroral program.**—*A.V.*

9.9–48 551.506.22:550.3:061.3

L'expédition Antarctique belge 1957/1958: Programme scientifique. [The Belgian Antarctic Expedition, 1957/1958: Scientific program.] *Ciel et Terre*, Brussels, 73(7/8):389–399, July/Aug. **1957. DLC**—Members of Belgian IGY committee under J. VAN MIEGHEM, general program, meteorological, aerological, geomagnetic, earth currents, auroras, ionosphere, glaciology, oceanography and miscellaneous programs are elaborated on in this article. The specifications for radiosonde equipment and for observations of cosmic rays, solar radiation, radioactivity, atmospheric electricity, glacier radioactivity, as well as meteorology, are given in detail. *Subject Headings:* **1. Belgian participation in IGY 2. IGY Antarctic program 3. Antarctica. I. Van Mieghem, J.**—*M.R.*

9.9–49 551.506.22:52

MacRae, D. A.; Jacobs, J. A. and Godson, W. L., **International Geophysical Year.** *Royal Meteorological Society, Canadian Branch, (Publication)*, 8(2), April 25, **1957.** 12 p. Contents: MacRae, Donald A.: **Astronomy and the International Geophysical Year.** Jacobs, J. A.: **Glaciology and the International Geophysical Year.** Godson, W. L.: **Canadian meteorological program for the International Geophysical Year. DWB**—Astronomy, meteorology and geophysics, as discussed in Pt. (1) in connection with the IGY, do not constitute separate disciplines but overlap in connection with studies of geomagnetism, aurora and airglow, ionospheric physics, solar activity, cosmic rays, longitude and latitude, seismology, gravity, meteors, and

satellites. Even the choice of the years 1957–58 was based on astronomical (solar activity) considerations. Glaciology is closely connected with meteorology and oceanography in the IGY program. The volume of ice locked in the polar and Greenland ice masses and consequences of its melting; study of snow stratigraphy and (2) the 3 proposed Canadian glaciological expeditions to Salmon Glacier, B. C., Lake Hazen on Ellesmere Island, and the Snow Cover survey, respectively and (3) the meteorological program, are discussed. *Subject Headings:* **1. Canadian IGY program 2. IGY astronomical program 3. Canadian IGY glaciological program.**—*M.R.*

9.9–50 551.506.22:550.3

Roberts, Elliott B. and Knapp, David G., **Geomagnetism in the International Geophysical Year.** *U. S. Coast and Geodetic Survey, Journal*, No. 6:4–10, Aug. 1955. figs., 2 photos. DLC, DWB—A broad, comprehensive, illustrated article on the history and purposes of IGY, 1957–58 and the problems concerning the ephemeral aspects of geomagnetism which are of interest to the U. S. Coast and Geodetic Survey and which might be solved by the proposed intensified networks and concentration on certain aspects of geomagnetism, such as those produced by solar flares, etc., ring or sheet currents, ultraviolet radiation effects, etc. World days, regions of study and observatories planned by the U. S. National Committee (Alaska, Pacific Ocean and Antarctica) are also discussed. *Subject Headings:* **1. IGY geomagnetic program 2. Geomagnetic networks.**—*M.R.*

WMO

See: **WMO Executive Committee Meetings,** 9.9–51; **WMO Regional Ass'n. II, Asia,** 9.9–52; **WMO Regional Ass'n. IV, N. and Central America, and Hurricane warning services,** 9.9–53.

SYMPOSIA AND CONFERENCES

See also: **Applied met. conf.,** 9.9–5; **Astronautics symposia,** 9.9–71.

9.9–51 551.5:061.

World Meteorological Organization. Executive Committee. **Eighth session (Palais des Nations, Geneva, April 17–30, 1956).** *World Meteorological Organization, WMO Bulletin* 5(3):86–89, July 1956.—Subjects considered at this important meeting included IGY, atomic energy, climatic atlases, water resource development, arid zone and humid tropics, networks, aeronautical meteorology, as well as administrative, secretarial and financial questions. *Subject Heading:* **1. WMO Executive Committee meetings.**—*M.R.*

9.9–52 551.5:061.3(5

*World Meteorological Organization. Regional Association II (Asia). **Abridged final report of the First Session, New Delhi, Feb. 2–14, 1955.** *World Meteorological Organization, WMO (Publication)* No. 43. RP. 19, 1955. 131 p. **Geographic place names in Resolution No. 4 (Basic network of surface and upper air observing stations for the Asia Region),** Annex, p. 75–123, in English, French and Russian. DWB (M0o W927r)—In addition to the list of representatives attending the session, the agenda and a general summary of the proceedings, there is included an itemized account of the resolutions and recommendations adopted by the session. These covered instrumental standardization, methods in standards of observation, transmission of meteorological and climatological data, etc. The report contains a map showing the location of meteorological broadcasting stations over the continent of Asia and sub-continent of Asia and a list of the basic network of surface and upper air observations stations for the Asia region, analyzed by code number and giving the type of observations made. *Subject Headings:* **1. WMO Regional Association II, Asia 2. Asia.**—*I.L.D.*

9.9–53 551.5:061.3:551.515.

World Meteorological Organization. Regional Association IV, Eastern Caribbean Hurricane Committee. **Report of the Fourth session of the Committee, Ciudad Trujillo, Dominican Republic, April 25–27, 1956,** pub. 1956. 32 p. DWB (M0o W927s 1956)—

Complete transactions of meeting attended by 6 members, 9 advisers, and 7 observers under chairmanship of W. A. GRINSTED. Resolutions concern communications, warnings, exchange and publication of climatic information, hurricane seminar, nomenclature and technical assistance. The organization of Hurricane Warning Service, a review of the 1954 and 1955 seasons, and arrangements for 1956, reconnaissance, the papers given at Seminar Feb. 16–26 in Ciudad Trujillo and a review of U. S. Hurricane Research Project are included in detail. *Subject Headings:* **1. WMO Regional Association IV, North and Central America 2. Hurricane warning services 3. U. S. National Hurricane Research Project 4. Eastern Caribbean.**—*M.R.*

9.9–54 620.92:551.521.1

Lauscher, Friedrich (*Vienna*), **Die Energiequellen und ihre Nutzung.** [Sources of energy and their utilization.] *Wetter und Leben*, Vienna, 9(1/2):22–29, **1957.** table. **DLC**—A summary from the proceedings of the 5th World Power Conference is given of some discussions of the utilization of solar energy for power production with special reference to Israel, France, etc., the solar battery developed by Bell Telephone in the U. S. and the utilization of earth heat and also of some studies on smoke diffusion, etc. *Subject Headings:* **1. Solar energy utilization 2. Solar power 3. Solar battery.**—*I.L.D.*

SERVICES, INSTITUTIONS AND OBSERVATIONS

See also: **Hydrologic station personnel improvement** (Mozhaikin), 9.9–272; **Climatological research, Poland** (Okołowicz), 9.9–278.

9.9–55 551.579:061

Morozov, P. N., **Dvadtsatipiatiletie Leningradskogo gidrometeorologicheskogo instituta.** [25th anniversary of the Hydrometeorological Institute of Leningrad.] *Meteorologiia i Gidrologiia*, No. 5:5–7, May **1956. DWB, DLC**—The Leningrad Hydrometeorological Institute was established in 1930 as a branch of the M. V. LOMONOSOV University of Moscow. An account of its educational activity and of its role in the development of hydrometeorology in the U.S.S.R. and a list of some of the distinguished Soviet hydrometeorologists associated with it are given. *Subject Headings:* **1. Leningrad Hydrometeorological Institute 2. U.S.S.R.**—*I.L.D.*

9.9–56 551.46:061

Sysoev, N. N., **Chernomorskaia eksperimental'naia stantsiia Instituta okeanologii AN SSSR.** [The Black Sea Experimental Station of Institute of Oceanology of the Academy of Sciences, U.S.S.R.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geog.*, No. 5:90–91, Sept./Oct. **1955. DLC**—The experimental station is situated 16 mi from Gelendzhik, eight mi off shore where the water reaches a depth of 1700 m. Research is conducted on the morphology of sea coasts, the hydrodynamics and dynamics of waves in shallow coastal water, development of apparatus for deep sea research, etc. *Subject Headings:* **1. Oceanographic institutes 2. Oceanographic research 3. U.S.S.R. Institute of Oceanology of the Academy of Sciences. Black Sea Experimental Station.**—*I.L.D.*

9.9–57 551.5:061

Eaton, Max A., **International Institute of Meteorology, Stockholm, Sweden.** *U. S. Office of Naval Research, London, Technical Report*, ONRL'38'57, April 2, **1957.** 11 p. **DWB**—This report describes the origin and the activities of C.-G. ROSSBY's International Institute of Meteorology of the University of Stockholm. It has enjoyed a healthy growth since its inception after World War II largely due to generous contract research support by ONR and other agencies. To date, 17 different countries have been represented by research workers at the Institute so that the "atmosphere" is truly international At present the program is centered around numerical forecasting, atmospheric chemistry, air-sea boundary oceanography, and cloud physics. The various active research projects are briefly described. *Subject Headings:* **1. International Institute of Meteorology, Stockholm, Sweden 2. International cooperation in meteorology 3. Rossby, C.-G.**—*Author's abstract.*

EDUCATION, HISTORY AND BIOGRAPHY

BIOGRAPHY

See also: **Hydrodynamics, Theodor von Kármán** (Ippen), 9.9–79.

9.9–58 551.58:92

McGuire, James K. (*U. S. W. B., N. Y., N. Y.*), **The father of American climatology.** *Weatherwise*, Boston, 10(3):92–94, 97, June **1957.** 8 refs. **DWB**—Remarks on LOREN BLODGETT (1823–1901), a "practical" climatologist, in commemoration of the 100th anniversary of the first major study of the climates of the U. S. (536 pages). The lengthy and elaborate title page is reproduced in full in this article. He was a cooperative observer for Smithsonian Institute network 1849–51, employed by JOSEPH HENRY at Smithsonian (1851–54) to reduce meteorological records accumulating at that Institution. Also prepared register of army (Surgeon General) for 1843–54, which later became his famous book, which was unique for 70 yrs (until 1925). *Subject Headings:* **1. Biography of Loren Blodgett 2. Blodgett, Loren 3. History of climatology.**—*M.R.*

9.9–59 551.5:92

†Mikulski, Zdzislaw et al., [**Obituary of**] **Prof. Dr. Edward Stenz,** *Przegląd Geofizyczny*, Warsaw, 1(3/4):149–155, **1956.** English trans. p. 154–155. Also: **Bibliografia prac i artykułów E. Stenza.** [Bibliography of Stenz' works.] *Ibid.*, p. 156–165. 266 items. **DWB, DLC.** Also: Winid, Bogodar (*Instytut Geografii Pan—Warszawa*), **Zasługi Prof. Dr. Edwarda Stenza dla geografii regionalnej.** [Attainments of the late Prof. Edward Stenz in the field of regional geography.] *Przegląd Geofizyczny*, Warsaw, 1(3/4):167–169, **1956. DWB, DLC**—A long obituary on PROF. STENZ who died on Feb. 21, 1957. Born on Jan. 22, 1897, he attended Warsaw Univ. 1918–23; and received a Ph.D. in physics, geophysics and meteorology in 1926 at the Univ. of Wilno. Organized first Polish oceanographic research and marine meteorological service. Went to Afghanistan as Director of the Meteorological Service (May 1939–1948) and was Prof. of Geophysics and Physics at Kabul Univ. Returned to Poland in 1949. Went on several scientific expeditions. His scientific accomplishments, including popularization of earth science, are enumerated. His works (listed) number over 250. *Subject Headings:* **1. Biography of Edward Stenz 2. Bibliography of Edward Stenz. I. Stenz, Edward.**—*M.R.*

9.9–60 551.5:92

Rigby, Malcolm, [**Obituary of**] **C. E. P. Brooks.** *American Meteorological Society Bulletin*, 39(1):40–41, Jan. **1958. DWB, DLC**—DR. C. E. P. BROOKS was born Nov. 1888 in London and died Dec. 14, 1957 at his home in Sussex. His life, his career and the outstanding works in climatology, statistics, etc. are reviewed, and his international work in bibliography, astrophysical-geophysical relationships and global climatology mentioned. Paleoclimatology, Historical Climates, Applied Climatology, Long Range Forecasting, Solar-Terrestrial Relations, Applied Statistics and Library Practice are a few of the subjects on which he wrote well known books or manuals. He was responsible for the 25 years of Réseau Mondial (1910–34), the Bibliography of Meteorological Literature (1920–49), the U.D.C. for Meteorology (551.5), and for Upper Winds over the World (1950). Besides, he contributed >10,000 abstracts to *MAB* (1950–57) and assisted in other ways. *Subject Headings:* **1. Obituary of C. E. P. Brooks. I. Brooks, C. E. P.**—*M.R.*

HISTORY

See: **Loren Blodgett and history of climatology** (McGuire), 9.9–58.

BIBLIOGRAPHY AND TERMINOLOGY

See: **Antarctic meteorology** (bibliog), 9.9–1; **Auroral theories** (Chamberlain), 9.9–17.

9.9–61 629.19:016

†Koelle, H. H. and Kaeppeler, Hans J., **Literaturverzeichnis der Astronautik.** [Literature-index of astronautics.] Tittmoning, Obb., Verlag Walter Pustet, **1954.** 100 p. Price

DM 6.40. Title-page and Introd. also in English. **DLC** (Z5064.S7K6). Review by W. Schulz in *Zeitschrift für Flugwissenschaften*, Brunswick, 2(11):308, Nov. **1954.**—Classification of astronautical subjects under 10 major headings (and >1000 minor headings) is given in German and English. Meteorology comes under Geophysics (14), Climatology (143), Aviation meteorology (144), Synoptic meteorology and Weather modification (145), Atmos. acoustics, Optics and Electricity (146); under 141–149 about 45 references to recent literature (1931–53) are listed (p. 42–43). A list of journals and periodicals is found on p. 7–9. Some material of meteorological interest is found in other sections. *Subject Headings:* **1. Astronautical literature classification 2. Astronautics bibliographies. I. Saenger, E. II. Gesellschaft für Weltraumforschung e. V., Stuttgart.**—*M.R.*

9.9–62 551.579:016(47)

†Akademiia Nauk SSSR. Komitet po Geodezii i Geofizike, **Soobshcheniia o nauchnykh rabotakh po gidrologii. Predstavliaetsia v Mezhdunarodnyiu Assotsiatsiiu Nauchnoĭ Gidrologii k XI General'noĭ Assamblee Mezhdunarodnogo Geodezicheskogo i Geofizicheskogo Soiuza.** [Bibliography of scientific reports in hydrology, presented at the XI General Assembly of the I.U.G.G. Association of Scientific Hydrology.] Pub. Moscow, **1957.** 30 p. 552 refs.—Along with an author bibliography of 550 references to periodical and monograph literature in various fields of hydrology (1950–56), there is a 12 page account of progress in hydrological research in several fields: surface water, ground water and snow and ice research, wherein the works of various authors and institutes throughout the Soviet Union are presented. *Subject Headings:* **1. Soviet hydrology bibliographies 2. Hydrology bibliographies. I. I.U.G.G. Association of Scientific Hydrology, Toronto, 1957.**—*M.R.*

9.9–63 551.58:019.941(05)

†**Polska Bibliografia Analityczna, Geografia,** [Polish Scientific Abstracts: Geography], Vol. 1, No. 1, **1956.** 88 p. Abstracts 1–168. Issued by Polska Akademia Nauk. Osrodek Bibliografii i Dokumentacji Naukowej (Polish Academy of Sciences. Center of Bibliography and Scientific Documentation). Price: (this issue) zl 13,50. Abstracts in Polish, with English headings. Microfilm, translations, photocopies, etc. on application to Center, Palac Staszica, Nowy Swiat 72, Warsaw. Also, 2(1), **1957,** items 169–468, 104 p.—In each issue of this annotated bibliography on Polish geographical articles, there is a section on **Klimatologia** (in Vol. 1, No. 1 there are 20 items, p. 49–58; in Vol. 2, No. 1, 23 items, p. 54–61). Annotations vary in length. English translations of titles are included. *Subject Headings:* **1. Abstracting periodicals 2. Climatology abstracts 3. Poland. I. Polska Akademia Nauk.**—*M.R.*

9.9–64 551.574.1:001.4 536.42

McDonald, James E., **Nomenclature of phase transitions.** *Royal Meteorological Society, Quarterly Journal,* 84(359):74–75, Jan. **1958. DWB, DLC**—Proposal to substitute the term *deposition* for the ambiguous use of sublimation for vapor to solid transitions, thus enabling the use of 6 precise terms for the 6 possible phase changes (instead of only 5), and also the use of *deposition nucleus* and *depositional growth. Subject Headings:* **1. Terminology 2. Sublimation-deposition distinction 3. Deposition definition.**—*M.R.*

9.9–65 551.5(03)

Spar, Jerome (*Glen Rock, N. J.*), **Glossary of weather words.** *American Petroleum Institute, 36th annual meeting, Chicago, Nov. 1956, Proceedings,* Section 6/7:87–93, **1956. DLC**—Some 100 basic terms in meteorology and climatology are listed, defined and explained. *Subject Heading:* **1. Meteorological glossaries.**—*G.T.*

9.9–66 523.7:001 629.19:001

Ashbrook, J.; Schilling, G. F. and Sterne, T. E. (*all, Astrophysical Obs., Smithsonian Inst.*), **Glossary of astronomical terms for the description of satellite orbits.** *Smithsonian Institution, Astrophysical Observatory, IGY Project No. 30.10, Special Report,* No. 4, Nov. 30, **1957.** 9 p. **DWB.** Bound in: Sterne, Theodore E. (*Smithsonian Astrophysical Obs.*), **Celestial mechanics of artificial satellites.** Reprinted from *Sky and Telescope,* 17(2):Dec. **1957.** Reprint of 7 p. tables, figs. Also issued in "edited form" as *Smithsonian Contributions*

to Astrophysics, Wash., D. C., 2(10):211–217, **1958. DWB, DLC**—An index of 45 astronautical and astronomical terms, and an index of 23 symbols used in satellite observation and computation, a systematic glossary of terms with full explanation where necessary and an article of the celestial mechanics of artificial satellites by THEODORE E. STERNE is included in this report. *Subject Headings:* **1. Astrophysical terminology 2. Celestial mechanics 3. Satellite orbits.**—*M.R.*

APPLIED METEOROLOGY

OCEANOGRAPHY AND MARINE METEOROLOGY

See also: **Antarctic met.** (van Rooy), 9.9–1; **Popular oceanog.** (Cook), 9.9–13; **Oceanog. tables** (Zubov), 9.9–36; **Oceanog. institutes and research, Black Sea, U.S.S.R.** (Sysoev), 9.9–56; **Numerical sea condition forecasts** (Hubert), 9.9–133; **Sea surface temp. variations, N. Pacific** (Rodewald), 9.9–201.

9.9–67 551.46(263.4)

Texas. Agricultural and Mechanical College. Dept. of Oceanography and Meteorology, **Physical, chemical, geological and biological oceanography in the Gulf of Mexico.** Contract N7onr-48702, Annual Report, 1 May 1956–30 April 1957. May 1, **1957.** 18 p. 19 figs. (incl. photo). **DWB**—A report of 16 oceanographic cruises during 1955, 56 and 57, in the Gulf of Mexico, describing equipment, cruises, procedures and showing routes and stations for each cruise. Future plans are outlined, especially for IGY in 1957 and 1958. *Subject Headings:* **1. Oceanographic cruises 2. Gulf of Mexico. I. Drummond, Kenneth H.**—*M.R.*

9.9–68 551.501.1:378.3(26)

Excellence awards to Australian selected ships. *World Meteorological Organization, WMO Bulletin*, 5(3):116–117, July **1956.** photo., table. **DWB**—A colored print, and a book on Australian subjects, inscribed for presentation to the ship and ship's observing officer, are presented to each selected ship and officer of the 27-ship Australian fleet who have consistently maintained a high standard of observing and reporting on a voluntary basis, over a period of 5 years or more. The first presentation was made by the Director, L. J. DWYER, on March 23, 1956 to the Master of the "Duntroon" and its radio operator, Mr. D. G. EADIE. At present (1955) 8,000 ships report 19,000 times a year. *Subject Headings:* **1. Cooperative observers 2. Marine meteorological observation 3. Awards 4. Australia.**—*M.R.*

9.9–69 551.511:551.555.1

Francis, J. R. D., **The sea, trade winds and weather.** *Weather*, 8(10):306–308, Oct. **1953.** 6 refs. **MH-BH**—Brief account of an expedition by the Imperial College, London to Anageda (18°N. 64°W.) to test theories of energy transfer in trade winds. Observations included upper winds and cloud photographs. *Subject Headings:* **1. Energy transport 2. Trade winds.** —*C.E.P.B.*

9.9–70 551.501(26) 551.524.4(26):551.526.6

Houghton, D. M., **Some interesting meteorological measurements at sea.** *Marine Observer*, 22(155):43–44, Jan. **1952. DWB**—Describes 2 profiles of air temperature gradient in lowest 12 ft in N. Atlantic, and discusses diurnal variation of air and sea temperature, with an estimate of error (0.5°F.) due to presence of ship. *Subject Headings:* **1. Marine meteorological observation 2. Temperature gradient.**—*C.E.P.B.*

ASTRONAUTICS AND SATELLITE OBSERVATORIES

See also: **Earth satellite** (Lewellen), 9.9–14; **Meteorite effects** (LaPaz), 9.9–18; **Astronautics bibliogs.** (Koelle, Kaeppeler), 9.9–61; **Astrophysical terminology** (Ashbrook et al.), 9.9–66.

9.9–71 629.19(08)

Astronautics Symposium, San Diego, Calif., Feb. 18–20, 1957, Summary session (Transcript of tape recording made during Summary Session, Feb. 19, 1957). Pub. **1957.** 55 p.

DWB (629.1388 A859o)—Among a number of problems discussed at this symposium and reported in brief in this publication are planetary atmospheres, our knowledge thereof and effects on re-entry, members of panels (re-entry, tracking and communications, environment and measurements, propulsion, orbits and human factors panels). *Subject Headings:* **1. Astronautics symposia 2. Planetary atmospheres. I. General Dynamics Corporation. Convair Div. II. U. S. Air Force. Office of Scientific Research.**—*M.R.*

9.9–72 551.510.53:629.13

Power, Thomas S. (*USAF*), **Air Force research and development in space technology.** *Aeronautical Engineering Review*, N. Y., 16(9):36–39, Sept. **1957.** port. **DLC**—Since airplanes (i.e., the Bell X-2) have now flown as high as 126,000 ft, they are effectively if not actually operating in "space," for 99% of the atmosphere lies below that level and many of the problems encountered are the same as if there were no atmosphere at all. Thus in any aviation system, knowledge of the environment (the atmosphere) at high altitudes is of vital concern. Solar radiation, air masses, the jet stream, ionosphere, cosmic rays, meteoric debris and their effects on planes, on rockets and communications and on each other are among the phenomena to be investigated intensively. Weather observation and forecasting, and human (biological) factors are no less important. *Subject Headings:* **1. Upper atmosphere research 2. High altitude flying 3. Space flight.**—*M.R.*

9.9–73 551.507.362.2:629.13

Jastrow, R. and Pearse, C. A. (*both, U. S. Naval Res. Lab., Wash., D. C.*), **Atmospheric drag on the satellite.** *Journal of Geophysical Research*, Wash., D. C., 62(3):413–423, Sept. **1957.** 7 figs., 9 refs., 14 eqs. **DLC**—The drag exerted on the satellite in its orbit arises from collisions with neutral air particles and partly from losses associated with the passage of a charged sphere through an ionized medium. It is found that the charged and neutral effects are comparable under the atmospheric conditions expected at an orbital altitude of 300 mi. *Subject Headings:* **1. Satellite drag 2. Neutral air particle collisions.**—*Authors' abstract.*

9.9–74 551.507.362.2

Tousey, R. (*U. S. Naval Res. Lab., Wash., D. C.*), **Optical problems of the satellite.** *Optical Society of America, Journal*, 47(4):261–267, April **1957.** 8 figs., 10 refs. **DLC, DWB**—A technical article discussing the launching vehicles: the problem of observation, tracking and visibility in daylight and twilight and at night, the radio and photographic tracking, the control of temperature in sunlight and shade, and optical experiments, including Lyman alpha hydrogen emission radiation from the sun. Work of the Naval Research Laboratory is emphasized. *Subject Headings:* **1. Satellite observatories 2. Lyman alpha observations.**—*M.R.*

9.9–75 551.507.362.2:629.19:551.524.7

Karpenko, A. G. and Lidov, L., **O temperaturnom rezhime iskusstvennogo sputnika Zemli.** [The temperature regime of an artificial earth satellite.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 4:527–533, April **1957.** 9 figs., 6 refs., 20 eqs. **DLC**—A mathematical analysis of the heat balance of an artificial satellite is presented. By assuming infinite heat conductivity of the body and complete nonorientation in space does not necessitate taking into account concrete parameters of the satellite. Calculations have been carried out for some circular orbits, and graphs of minimum and maximum temperatures attained by the satellite are presented as a fraction of the internal source of energy, and its heat capacity referred to the characteristic area and reflective characteristics of the surface. In addition, the influx of energy from solar radiation, and also from the earth in the form of heat radiation and reflection of solar radiation, are taken into account. The results of actual compilations are presented. *Subject Headings:* **1. Satellite temperatures 2. Satellite temperature calculations.**—*I.L.D.*

AERONAUTICAL METEOROLOGY

9.9–76 551.5:629.13:37(075)

International Civil Aviation Organization, **Aeronautical meteorological assistant (Training Manual, Pt. 6).** Its *Doc.* 7192-AN/857 Pt. 6, **1957.** 40 p. forms. **DWB** (629.13 I61t)—

Describes basic knowledge required for aeronautical meteorological assistants and forecasting a syllabus for technical training in elementary theory, observations, instruments, chart preparation, codes and communications, aviation knowledge, organization of analysis work, training methods in school and on the job, training aids (texts, WMO and ICAO publications) standards, and examination questions (examples). *Subject Headings:* **1. Training manuals 2. Aeronautical meteorology assistant training 3. Meteorological education.**—*M.R.*

9.9–77 551.582:551.509.58:629.13(67

§*Dhonneur, M., **Étude climatologique des routes aériennes aboutissant à Fort-Lamy** [Climatological study of the aerial routes ending at Fort-Lamy.] *France. Météorolog Nationale, Monographies*, No. 2, March **1957.** 49 p. 3 tables, numerous charts. **DWB**—routine route study for the Fort-Lamy (12°07′N, 15°02′E) area of the Sahara, including aeri cross sections, flight forecasts, typical synoptic case histories, data tabulation (e.g., haz thunderstorm frequency), etc. Synoptic types discussed and illustrated are: 1) NW flow 2) W to SW flow, 3) Sahara disturbance, 4) winter anticyclonic weather, 5) transitory dry an humid sequences and 6) summer rainy type. The 4 air routes run from Fort-Lamy to Rom Nice, Marseille and Orly to the N.; to Brazzaville, Bangui and Donla to the S.; to Abéch Khartoum and Djeddah to the E.; and to Kano, Dakar, Abidjan, etc. to the W. *Subje Headings:* **1. Air route forecast studies 2. Flight forecasts 3. North African air route 4. Fort-Lamy, French Equatorial Africa.**—*M.R.*

9.9–78 551.551.5:629.1

Heath-Smith, J. R., **Atmospheric turbulence encountered by Hermes aircraft.** *Far borough, England. Royal Aircraft Establishment, Technical Note, Structures 214*, Jan. 195 16 p. 4 figs., 7 tables (some fold.), 4 refs. **DWB** (629.1308 G786c No. 334)—Acceleratio records were obtained of the turbulence encountered by B.O.A.C. Hermes aircraft in 417,00 mi of operational flying on routes from London to East and West Africa. It is shown th turbulence decreases with increasing altitude. A result of the pilot's discretion in choice altitude and course is that the gust frequency encountered during most of the cruise is abo one-third of the average atmospheric gust frequency. Between 9500 ft and 14,500 ft gus were encountered four times as frequently over East and West African sectors as over Europe sectors. *Subject Headings:* **1. Turbulence encountered by airplanes 2. Turbulence avoidanc** —*Author's abstract.*

9.9–79 532.5:

Ippen, Arthur T. (*Massachusetts Inst. Technology*), **Hydrodynamics: A review of v Kármán's contributions.** *Journal of the Aeronautical Sciences*, N. Y., 23(5):438–443, 49 May **1956.** 5 figs. (incl. photos), 25 refs. **DLC**—A general review of the contributions of T VON KÁRMÁN to the theory of hydrodynamics and to practical applications of this theory. H work dates back to 1912. The entire issue is dedicated to VON KÁRMÁN on the occasion of h 75th birthday. He came to the U. S. in 1926 to lecture and became a citizen in 1936. A pap in some major area of VON KÁRMÁN's work, summarizing progress in that field, and writt by one of his former students, is included in this issue. *Subject Headings:* **1. Hydrodynami 2. Biography of Theodor von Kármán 3. von Kármán, T.**—*M.R.*

9.9–80 551.507.362

Masson, D. J. and Gazley, Carl, Jr., **Surface-protection and cooling systems for hig speed flight.** *Aeronautical Engineering Review*, N. Y., 15(11):46–55, Nov. **1956.** 15 fig 3 tables, 13 refs. **DLC**—Heating rate of an aircraft or rocket varies with local temperat speed, density (altitude) and distance from nose. Charts show variation with altitude different speeds and equilibrium temperatures. Cooling systems are described and perfor ance shown graphically. Radiative cooling systems would work only for satellite vehic where internal heat generation is small. The IGY satellite (20″) would have a skin tempe ture only 10°F. above its equilibrium temperature. Insulation is also feasible for some typ of aircraft. Electronic equipment must be kept cooler than skin or other fabric of the vehic *Subject Headings:* **1. Satellite cooling 2. Equilibrium temperatures of aircraft 3. Altitu effects on heating.**—*M.R.*

9.9–81 551.574.7:629.13

Mazin, I. P., **Nekotorye voprosy obledeneniia vintomotornykh samoletov.** [Some problems of icing of propeller-driven aeroplanes.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofizich.*, No. 4:534–539, **1957.** 6 figs., table, 8 refs., 6 eqs. **DLC**—In order to complete the degree of icing of an airplane it is necessary to know the coefficient of capture (E) of the wing profiles under given conditions of flow around them. The determination of E is reduced to finding the trajectories of aerosol particles near the object, that is, to integrating the equation of motion of these particles written in the following form:

$$\frac{d^2\vec{\rho}}{d\tau^2} = -\frac{1}{\rho}\left[\frac{d\vec{\rho}}{d\tau} - u(\vec{\rho})\right]\left[1 + 0.17\, Re_0^{\frac{2}{3}}\left|\frac{d\vec{\rho}}{d\tau} - u(\vec{\rho})\right|^{\frac{2}{3}}\right]$$

E depends upon ρ and Re_0, the parameter of drop inertia and the Reynold's number regularly. A diagram for determining E for wing profiles for known parameters of ρ and Re_0 is presented. Under flying conditions in clouds and fog when the wings of an airplane collide with drops of varying sizes the integral coefficient of capture (E) must be determined. Equations and diagrams for determining such a coefficient are presented and results of observations are given. *Subject Heading:* **1. Icing of aircraft.**—*I.L.D.*

AGRICULTURAL METEOROLOGY

See also: **Sunshine duration and tobacco cultivation, Switzerland** (Thams, Zenone), 9.9–172; **Frozen rice paddies** (Kashiwazaki), 9.9–199; **Tea cultivation, Kuban, U.S.S.R.** (Zinina, Fel'dman), 9.9–284; **Climate, Brazil** (Mota), 9.9–286.

9.9–82 551.577.3:551.579:631.67:633.71

*Miles, James D. (*Georgia Coastal Plain Experiment Station, Tifton, Ga.*), **Influence of irrigation on flue-cured tobacco in Georgia.** *Georgia. Agricultural Experiment Stations, Circular*, n.s., No. 8, Feb. **1957.** 19 p. 6 tables, 3 figs. **DWB** (M79.7 G532i)—Variations in the rainfall or lack of rainfall in the growing season in coastal Georgia is the chief hazard for tobacco growers. Over an 11 year period (1943–54), the yield for 7–21″ of rain in the growing season was 972 to 1646 pounds per acre, whereas with 18.5″ of rainfall the yield was 1328 pounds on the average. An experiment was conducted in 1951–54 to determine the value of supplemental irrigation during periods of drought during April–July. Rainfall, irrigation and crop yield data are given in tables. Late irrigation, rather than continuous irrigation, provides the best yields, the highest quality tobacco and best income. Irrigation early in season retards root development and leaches fertilizer. *Subject Headings:* **1. Rainfall variations 2. Irrigation experiments 3. Tobacco crop yield 4. Georgia.**—*M.R.*

9.9–83 551.577.38:631.2

Bonnen, C. A. and Ward, J. M. (*Texas Agricult. Exp Stn.*), **Some economic effects of drouth on ranch resources.** *Texas. Agricultural Experiment Station, College Station, Bulletin*, No. 801, March **1955.** 11 p. 8 figs. **DWB** (M77.38 B716s)—Economic data on 162 ranches near San Angelo, Tex., are presented along with precipitation data. Average rainfall for Sonora, San Angelo and Ozona (1921–1953) and 5-year moving averages for San Angelo (1906–1953) and Sonora (1921–1953) show serious deficiency in 1943–1953. The economic effects discussed include effect on livestock number, forage, financial resources and management. *Subject Headings:* **1. Drought effects on ranching 2. Ranching climate 3. Texas.**—*G.T.*

9.9–84 551.586:551.506.8:633.63

Kekukh, A. M. and Tregubova, A. S., **Vliianie agrometeorologicheskikh uslovii na vskhody sakharnoĭ svekly.** [The influence of agrometeorological conditions on the growth of sugar beets.] *Ukraine. Nauchno-Issledovatel'skiĭ Gidrometeorologischeskiĭ Institut, Trudy*, 4:54–58, **1955.** 4 tables, 6 refs.—On the basis of observations made at 13 hydrometeorological stations during 1953 and 1954, the author attempts to present the agrometeorological characteristics of the sugar beet growing areas in the Ukrainian SSR. During the sowing-sprouting period daily measurements were made of soil moisture at depths of 5, 10, 20 and 30 cm and of soil temperature at a depth of 5 cm. Also, the total precipitation, number of days with

precipitation and number of days with 10°C and above were determined. Data are presented on the computed meteorological material, frequency of number of days between sowing and sprouting, frequencies of sprouting on days with different totals of effective temperature, and dependence of data of sprouting upon soil temperature above 10°C. It was found that soil moisture during the sowing of sugar beets, generally does not limit the appearance of sprouts under the conditions prevailing in the Ukraine. Rapid sprouting on the 8–10th day depends upon warming of the soil when the mean daily temperature is 10°C and higher so that the heat at a depth of 5 cm accumulates uninterruptedly. Beginning of sowing and forecasting of sprouting should be regulated not by air temperature but by soil temperature at a depth of 5 cm within ranges of 5–10°C and over. *Subject Headings:* **1. Agricultural meteorology 2. Sugar beet growth 3. Soil temperatures 4. Sugar beet phenology 5. Ukraine.**—*I.L.D.*

9.9–85 551.509.621:632.111.

Lehmann, Paul, **Frostschutz durch biologische und Kulturmassnahmen, ferner durch Bedecken, Beheizen und kombinierte Methoden.** [Frost protection by biological and cultivation methods, as well as covering, heating and combined methods.] *Germany. Deutsche Wetterdienst, Mitteilungen*, 3(16):54–61, **1956.** 9 figs. (incl. photos). **DWB**—The author discusses the breeding and use of frost resistant crop varieties, cultivation facilities enabling the retention of heat by the soil and reduction of nocturnal heat loss by the use of sprinkling, covering of plants with straw or leaves, the use of fans to produce air turbulence near the ground, various types of heating devices and smoke and fog production methods, etc. Photographs of some of the apparatus, and graphs of temperature regimes at the ground level associated with some of the frost protection techniques are presented. *Subject Headings:* **1. Frost protection 2. Frost resistant crops.**—*I.L.D.*

FOREST METEOROLOGY AND FIRE WEATHER

9.9–86 551.586:634.9:582.4

Hocker, Harold W., Jr. (*Duke Univ., Durham, N. C.*), **Certain aspects of climate as related to the distribution of loblolly pine.** *Ecology*, Durham, North Carolina, 37(4):824–834, Oct. **1956.** 3 figs., table, 40 refs. **DWB, DLC**—An attempt was made to determine the relationship between climatic factors and the present natural distribution of loblolly pine and to test the applicability of the discriminant function as a statistical method for use in studies of this type. The construction of a map showing the present natural range of loblolly pine, the situation of relevant climatic variables—mean monthly temperature, mean maximum and mean minimum monthly temperature, mean monthly precipitation, mean number of days per month with precipitation of 0.01 in. or more, mean number of days per month with precipitation of 0.0 in. or more and dates of the last frost in the spring and first autumn frost—and the situation of climatological stations are discussed in detail. Twelve factors were found to contribute significantly to the climatic differences between regions where loblolly pine grows naturally and where it does not, and a distribution function was devised in terms of these 12 factors. The application of this equation to classifying a given location with reference to the climate of the loblolly pine regions is illustrated. *Subject Headings:* **1. Climatic studies 2. Pine tree distribution 3. Forest ecology.**—*I.L.D.*

9.9–87 551.584:551.556.

Ota, I. and Motoki, S. (*Govt. Forest Experiment Station*), **Meteorological investigation in the nursery, Pt. 2.** *Journal of Agricultural Meteorology*, Tokyo, 11(4):133–135, March **1956.** 3+figs. (incl. photos), 3 refs. In Japanese; English summary p. 135. **DWB**—In order to obtain the fundamental data about the available shelterhedges, we investigated the climatic factors, chiefly wind velocity and air temperature, near the hedges at Udagawa nursery of Tochigi Prefecture in October 1954. These hedges consisting of Hinoki were 3 m high with a width of 1 m and the void ratio of the hedges was about 10%. The results of field measurement are as follows: (1) The wind velocity at the windward point on 5 times the hedge height reached 116% to the standard wind velocity at the leeward point on 16 h (h=the hedge height). At leeward points on 2 h, 4 h and 8 h, 0%, 29% and 55%, respectively, to the standard wind

elocity. We found that the wind velocity was changed remarkably between the shelter-edge and the leeward point about 4 *h*. This trend was as same as that of evaporation. hese measurements were done at 30 cm high above ground surface. (2) As to air temperature t 30 cm high above ground surface, if the wind blows, the air temperature near the hedges as higher in the daytime and lower in the night-time than that of other places. But if it does ot blow, there was not any difference anywhere. As to ground temperature, it was always igh at leeward place near the hedges except in the case of rainfall. Above mentioned results ere obtained when the north wind blew. *Subject Headings:* **1. Shelter belts 2. Micro-limatic control 3. Udagawa, Japan.**—*Authors' abstract.*

9.9–88 551.509.56/58:632.187

§*Turner, J. A., **Lightning fires over southeastern British Columbia.** *Canada. Meteoro-ogical Div., CIR*-2659, TEC-216, May 27, **1955.** 7 p. 5 figs., 3 tables, 10 refs. **DWB, DLC**—A study of bad lightning fire days at Kamloops, Nelson Forest of S.E. British Columbia n relation to surface and 500 mb circulation (from Historical weather maps for 1947–52) hows that the greatest proportion of fire days occurred with southwesterly flow at 500 mb nd east or southeasterly flow at the surface. A contingency table shows fire day frequency y direction of 500 mb and surface flow. Persistence in fire days and in no-fire days is highly ignificant: of 73 fire days, 39 followed fire days. A 500 mb thermal trough, triggered by a eak frontal system moving into the trough, or associated with a stationary front south of he area, gives the greatest risk. Northwesterly flow at 500 mb with N. or N.E. flow at the urface also gives high risk. Synoptic charts illustrate 3 of the worst fire days. *Subject Headings:* **1. Fire weather forecast studies 2. Lightning risk data 3. Objective thunderstorm orecasting 4. Kamloops, Nelson Forest, Canada.**—*M.R.*

INDUSTRIAL METEOROLOGY

9.9–89 551.509.33:551.524.36:662.6

Smith, Charles Pennypacker (*Pacific Gas and Electric Co., San Francisco*), **Weather nformation applied to fuel supply planning.** *American Petroleum Institute, 36th Annual Meeting, Chic., Nov. 1956, Proceedings*, Section, 6/7:58–61, 1956. 10 figs. **DLC**—In the heat-ng gas industry, as in the petroleum industry, long range forecasts of temperature and weather ould be of untold value. But since these forecasts are not now reliable enough, a tool which an now be applied (i.e., statistical probabilities based on past records) permits calculated isks to be taken which cut costs in production. Examples from San Francisco records (1871–956), a forecast for Jan. 1961, and an analysis of degree days in 1955–6 against gas consump-ion showing high correlation in spite of some scatter, are presented. Persistence from the pring quarter of one year to the degree-day totals for the following fiscal year is high enough o serve as a basis for calculated risks, as demonstrated. Tables for Chicago also show high ersistence. *Subject Headings:* **1. Seasonal degree-day forecasts 2. Gas industry.**—*M.R.*

9.9–90 551.584:69

Zawadil, R. (*Vienna*), **Hitze und Kälte im Bauwesen.** [Heat and cold in construction.] *Wetter und Leben*, Vienna, 7(5/6):127–136, **1955.** fig., 3 tables, 7 refs. **DLC, DWB**—The daptation of construction practices to climatic conditions is discussed. The application of emperature probabilities to pouring of concrete in housing construction and in various opera-ions in stream regulation; and long range prediction of hot summers and cold winters on the asis of statistical climatology are considered. *Subject Headings:* **1. Building climatology . Building construction 3. Temperature effects on concrete pouring.**—*I.L.D.*

9.9–91 697.1:691:536.2

†van Gunst, E. and van Zuilen, D. (*both Research Inst. for Public Health Engr., T.N.O., Netherlands*), **The influence of moisture content on thermal conductivity of building materials.** In: Building Research Congress, Garston, 1951, **Papers presented in Division 3.** pub. **1951.** . 94–98. 5 tables, 25 refs.) **DWB**—Experiments designed to investigate the moisture ontent and moisture distribution within walls and their influence upon thermal conductivity

are described. After a brief review of the world literature on the influence of moisture content on the thermal behavior of buildings, the authors describe in detail the experimental set-up used by CAMMERER in Holland for such investigations. Data are presented on the influence of physical structure on thermal conductivity, mean coefficient for thermal conductivity, for cellular concrete in "completely dry" and "incompletely dry" conditions, moisture content under normal service conditions of inorganic materials, the influence of moisture content on the coefficient of thermal conductivity of building materials, etc. *Subject Headings:* **1. Thermal conductivity of building materials 2. Moisture content of walls.**—*I.L.D.*

9.9–92 551.5:7

Roux, A. J. A. (*Natl. Bldg. Res. Inst., Pretoria, S. Africa*), **The effect of weather conditions on heat transfer through building elements.** (In: Building Research Congress, (Garston) 1951, **Papers presented in Division 3.** pub. **1951.** p. 82–87. 5 figs., table, 17 refs.) **DWB** (624 B932p)—The author outlines the present state of knowledge regarding the effect of weather conditions upon heat transfer through a building. The following aspects are considered: the relationships between weather elements and heat exchange phenomena, both on the outside and inside surface; the role of weather elements in heat transfer, and design climatic conditions. *Subject Headings:* **1. Building design 2. Heat transfer through buildings.**—*I.L.D.*

9.9–93 551.58:551.525.5:62(98)

Potter, William Everett, **Analysis of design factors for power, heating, ventilating, and refrigeration systems for Alaska.** (In: **Dynamic North.** Wash., D. C., Technical Assistant to Chief of Naval Operations for Polar Projects, **1956.** Vol. 2, Pt. 7 looseleaf. 11 p.) **DWB**—Factors affecting power, heating, air conditioning, refrigeration and distributing systems in Alaska are reviewed briefly under the headings: Climate, Permafrost, Ice fog, Snow, Earthquakes and a number of technical engineering subjects. Only general information is given for the nonengineering aspects. *Subject Headings:* **1. Arctic engineering climatology 2. Permafrost 3. Alaska.**—*M.R.*

MEDICAL METEOROLOGY

9.9–94 551.524:551.586:591.1(98.99.213)

†Wilson, Ove, **Adaption of the basal metabolic rate of man to climate: a review.** *Metabolism*, N. Y., 5(5):531–542, Sept. **1956.** 190 refs. **DLC**—The author reviews about 20 studies of basic metabolism of men and mice (or rats) in Arctic, tropic and temperate conditions and in control chambers. Although evidence is conflicting, to say the least, he concludes that there is a significant lowering of metabolism among white men going from temperate zone to the tropics; that only among Eskimos is there evidence of a definitely higher rate of metabolism than is normal for people in temperate zones; that there is as much evidence of decreased metabolism (hibernation) among white people going into Arctic or Antarctic environments as there is of increased metabolism (as occurs among rats and mice); that often an initial increase in metabolism upon entering a cold environment gives way to a decrease in B.M.R. after a few days; that any increase may be due to greater activity or protein intake and that seasonal changes which are observed may also relate to activity or diet. *Subject Headings:* **1. Temperature effects on metabolism 2. Tropical climate effects 3. Acclimatization.**—*M.R.*

9.9–95 551.586:582

Giordano, Antonio (*Via Mazzini 12, Stradella, Pavia*), **Contributo allo studio delle meteoropatie: un nuovo test biologico.** [Contribution to meteoropathology: a new biologic test.] *Geofisica e Meteorologia*, Genoa, 4(3):49–60, May/June **1956.** 5 figs., 2 tables, et **DWB**—The effect of various meteorological factors on the reproduction rate of the *leave saccharomyces ellipsoideus* was investigated. During thunderstorms or frontal passage fermentation was found to be interrupted in copper receptacles while it continued normally in iron or steel containers. Fermentation was found to react similarly to solar activity and cosmic radiation. *Subject Heading:* **1. Bioclimatology of fermentation.**—*G.T.*

9.9–96 551.510.42

Lebedov, Iu. D., Nedogibchenko, M. K. and Glebova, L. F., **Nekotorye itogi i blizhaĭshie zadachi gigienicheskoĭ nauki i sanitarnoĭ praktikĭ v oblasti okhrany atmosfernogo vozdukha gorodov.** [Some results and immediate problems of hygiene and sanitation practice in the protection of city air.] *Gigiena i Sanitariia*, Moscow, 45(11):3–8, Oct. **1956.** table. **DLC**—The author reviews the various measures undertaken by the various industrial ministries of the U.S.S.R. to minimize and eliminate atmospheric pollution; summarizes various scientific methods developed during the period 1949–1956 for cleansing industrial affluents ejected into the atmosphere, and presents a table giving the limiting values of permissible concentrations of injurious atmospheric pollutants as established by the government sanitary inspection service of the U.S.S.R. *Subject Headings:* **1. Atmospheric pollution control 2. U.S.S.R.**—*I.L.D.*

9.9–97 551.510.42:614

Mancuso, Thomas F. and Mordell, J. Solon (*U. S. Public Health Service*), **Proposed initial studies of the relationship of community air pollution to health.** U. S. Public Health Service, Oct. **1955** (revised). 58 p. Mimeo. **DWB** (M10.42 U586p)—Detailed proposals are made for a research program to cover the medical aspects of atmospheric pollution. The research proposed includes epidemiological studies (statistical analysis of mortality and morbidity trends by residence, (a) in general and (b) for the medically impaired) and studies of biological effects of atmospheric pollution (effects on tissue culture, chick embryo, enzymes, microorganisms, lung cancer and the eye). *Subject Headings:* **1. Atmospheric pollution effects 2. Public health.**—*G.T.*

9.9–98 551.586:599.32

Marsh, Frank, **Reactions to great environmental heat in animals.** (In: Institute of Biology, London, **Biology of deserts.** London, **1954.** p. 188–192.) **DWB**—Experiments dealing with the physiological responses of rabbits to high external temperatures are summarized. The responses in body temperature, respiration rate, heart rate and blood pressure, the onset of collapse and revival by cooling are described for individual experimental animals. *Subject Headings:* **1. Heat effects on rabbits 2. Rabbits.**—*I.L.D.*

STATISTICS

See: **Smoothing techniques** (Holloway), 9.9–19.

METEOROLOGICAL OBSERVATIONS AND INSTRUMENTS

METHODS OF OBSERVATION

See also: **Smoothing techniques** (Holloway), 9.9–19; **Radio noise meas. techniques** (Beynon, Brown), 9.9–31; **IGY auroral program** (Nicolet), 9.9–47; **Marine met. obs. awards, Australia,** 9.9–68; **Temp. gradient and marine met. obs** (Houghton), 9.9–70; **Dew meas. techniques, Iowa** (Shaw), 9.9–243; **Raindrop size distribution meas.** (Magono), 9.9–256; **Statistical methods in climatology** (Pedelaborde), 9.9–279; **Atmospheric electricity meas.** (Gonsior), 9.9–303.

9.9–99 551.501:551.578.41

McGuire, James K. (*Northeast Area Climatologist, U. S. W. B., N. Y.*), **Snowflakes as question-marks.** *Weatherwise*, Boston, 9(5):165–171, Oct. **1956.** 5 figs. (incl. photos), 3 tables, 8 refs. **DWB**—Extensive notes and comments on the traditional 10:1 ratio for computing snow depth vs. water equivalent. The variability is shown in tables and the proper procedures for cooperative observers to use in measuring and estimating snowfall and snow depth are outlined. The uses of carefully observed records are emphasized by examples, including a graph showing percentage chance of first and last 1 in. and 3 in. snowfalls during Oct.–April (Baltimore, 1898–1955). Snow tends to become less dense as winter progresses

and as temperatures decrease, though not uniformly. *Subject Headings:* **1. Snowfall measurement 2. Water content of snow 3. Snow density 4. Baltimore, Md.**—*M.R.*

9.9–100 551.501.4:551.577.37

Levert, C. (*Netherlands Met. Inst.*), **Toepassing van de "Theorie der extreme waarden" op de berekening van de frequentie van extreme hoeveelheden in regens van verschillende duren.** [Application of the so-called "Theory of extreme values" to the computation of the frequency of very large amounts of precipitation in rains of varying duration.] (In: Nederlandse Centrale Organisatie voor Toegepast-Natuurwetenschappelijk Onderzoek. Commissie voor Hydrologisch Onderzoek, **Verslagen technische bijeenkomsten 7–10 en Verslag inzake het verdampingsonderzoek in de Rottegatspolder 1947–1952.** 's-Gravenhage, **1955.** p. 20–32, 6 figs. (incl. photos), 3 tables, 19 refs. English summary p. 260; French summary p. 282.) **DWB**—The theory of extreme values, by means of which the principal parameters of the frequency distribution of the largest of a random sample can be determined, is presented and its application is illustrated with reference to the annually largest monthly amount of precipitation at De Bilt for the period 1849–1946 and to the annually largest 24-hr amount of rainfall at De Bilt for the period 1901–1940. Also, the annually largest amount of precipitation in terms of total duration of t minutes (where $t=1 \ldots 5$, $t=6\text{–}10 \ldots$) was determined for De Bilt, and the mean and the most probable values of the annually largest amount measured in a rain and the mean return periods of the very large values of the annually largest rainfall were calculated with the aid of the theory of extreme values. *Subject Headings:* **1. Extreme values theory 2. Excessive rainfall frequencies 3. De Bilt, Netherlands.**—*Author's abstract and I.L.D.*

9.9–101 551.501.4:551.57

McDonald, James E., **Note on the precision of estimation of missing precipitation data.** *American Geophysical Union, Transactions,* 38(5):657–661, Oct. **1957.** 2 tables, 5 refs. **DWB, DLC**—Climatological studies in which early precipitation records are used, frequently lead to the necessity of estimating missing data. The present note summarizes a small series of tests of one objective estimation scheme, identical in form to the normal-ratio method of Paulhus and Kohler but applied here to missing seasonal totals rather than to missing storm totals. The results suggest that estimation errors in the neighborhood of 25% must be expected in estimating seasonal totals, using two index stations under conditions typical of those forced upon the investigator dealing with older records. Increasing the number of index stations beyond two does not seem warranted. Errors of 25% in seasonal totals, though not negligible, are small enough compared to coefficients of variation typical of seasonal totals of precipitation in the drier portions of the U. S., that the use of such a method in climatic studies is desirable. *Subject Headings:* **1. Precipitation estimation 2. Interpolation of records 3. Climatic studies.**—*Author's abstract.*

9.9–102 551.501.

Batta, Erzsébet, **Különbözo terminusközépértékek összehasonlítása; I. rész, Hőmérséklet.** [Comparison of mean values for different hours of observation; Pt. 1, Temperature] *Időjárás,* Budapest, 55(5/6):145–151, May/June **1951.** 2 figs., tables. **DLC**—During World War II, temperature measurements in Hungary were often made at 19 h or 20 h instead of the usual 21 h. By comparing average diurnal temperatures (7, 14, 19 h; 7, 14, 20 h; 7, 14, 21 h) for six stations in the Carpathian basin, correction factors are derived for reducing all diurnal mean temperatures to the value corresponding to regular 7, 14, 21 h measurement. Correction factors are also derived for computing "actual average temperatures" used in comparison with foreign data. *Subject Headings:* **1. Homogeneity 2. Mean value computations 3. Hungary.**—*G.T.*

9.9–103 551.501.42:681

Hollitch, Robert S. and Hawkes, Albert K., **Catalog of devices useful in automatic data reduction.** Armour Research Foundation (of Illinois Inst. of Technology), Chicago, Contract AF 33(616)-3131, (unnumbered report), July 1956, issued as *U. S. Wright Air Development Center, WADC Technical Report,* 54-519, Pt. 2, First Revision (superseding Pt. 2, issued N

954), July 1956. 191 p. numerous photos. **DWB** (651.264 A733ca)—This catalog repre-ents an attempt to present in a compact form descriptions and operating characteristics of evices which have application in automatic data reduction systems. Its primary purpose to serve as a guide for consideration of equipment to be used in such data reduction systems. o this end, it may be found useful not only by Wright Air Development Center engineering ersonnel for whom it was prepared but also by those persons engaged in similar work at overnment and industrial installations. The majority of the devices described here are igital in nature, and of these, emphasis has been placed on equipment which performs analog digital conversion, that is, voltage to digital converters and shaft position encoders since is class of equipment occupies a leading position in systems for recording data automatically. lso included are digital plotters, printers, digital magnetic tape transports, high capacity emory systems, digital to analog converters, air-borne magnetic tape recorders, and certain emiautomatic devices, such as oscillogram and film measuring equipment which produce igital records. *Subject Heading:* **1. Automatic data reduction.**—*Authors' abstract.*

9.9–104 551.501.45

Levert, C., **Some theoretical considerations with regard to the homogeneity-criteria of elmert and Abbe.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B,* 8(2):260–6, 1957. 2 refs., eqs. English, German and French summaries p. 260–261. Also his: **orrection to above article.** *Ibid.,* 8(3/4):431–432. **DWB**—The criteria of HELMERT and BBE regarding homogeneity of two series are examined and various objections are found. oth criteria should be avoided and some one other test chosen. *Subject Heading:* **1. Homo-eneity.**—*C.E.P.B.*

9.9–105 551.501.6:551.579

Weiss, L. L. (*U. S. W. B., Wash., D. C.*), **A nomogram for log-normal frequency analysis.** *merican Geophysical Union, Transactions,* 38(1):33–37, Feb. **1957.** 3 figs., 2 tables, 2 refs., 2 eqs. **DWB, DLC**—A nomogram is presented for determining log-normal return period nounts directly from the mean and standard deviation of the annual-maximum series values. he return-period amounts, as computed on the basis of a log-normal analysis, are compared ith those from a Gumbel analysis in the form of ratios as a function of the coefficient of ariation of the annual-maximum series amounts. *Subject Heading:* **1. Hydrologic nomograms.** *-Author's abstract.*

9.9–106 551.501.7:551.507.352:551.515.3

Van Thullenar, C. F. (*Chief, District Meteorologist, U. S. W. B., Kansas City, Mo.*), **The rnado research airplane.** *Weatherwise,* Boston, 10(3):82–84, 104, June **1957.** 3 figs. (incl. hoto). **DWB**—An F-51 research airplane equipped to measure vertical distribution of ressure, temperature, humidity, etc. in association with severe squalls (that might develop to tornadoes), rather than merely observing funnel clouds was owned and operated by JIM OOK under contract with U. S. W. B. based at Dallas, Texas, in 1956 and 1957. Vertical otions preceding squalls and cooling resulting from precipitation, which also affects develop-ent and progress of squalls, are studied from photographic and instrumental observations ade by this plane for U. S. Air Weather Service and U. S. W. B. Schematic flight plans get maximum information from squall area during its formation, is described and illustrated. *ubject Headings:* **1. Tornado research airplanes 2. Aircraft weather reconnaissance 3. Se-ere squall research 4. Dallas, Texas.**—*M.R.*

9.9–107 551.501.7:551.510.53

Vassy, E., **La haute atmosphère.** [The upper atmosphere.] *La Météorologie,* Paris, h Ser., No. 35:185–194, July/Sept. **1954.** 12 figs. **DWB**—Review of different indirect ethods for obtaining information on the high atmosphere (radio and sound propagation, eteors, ozone, twilight airglow and auroral data), and direct methods used since the war ockets) to obtain density, temperature, chemical composition, ozone and mass spectrometer ata. Measurement of electrical properties by means of (a) UHF; (b) the U. S. Naval Re-arch Laboratory (NRL) method using two figures, 2.34 Mc and 25.6 Mc, or the sixth harmonic the first, to determine ionization at 80–160 km; (c) the Langmuir method which determines

that no electrons exist below 70 km, although + and − ions occur at 60 km; and (d) Doppl method are described. *Subject Headings:* **1. Upper atmosphere structure 2. Upper atmosphe research 3. Rocket sounding.**—*M.R.*

9.9–108 551.501.81:551.510.

Ament, W. S.; Macdonald, F. C. and Ringwalt, D. L., **Scatter propagation in thunde storm conditions.** *U. S. Naval Research Laboratory, Report of NRL Progress*, August 195 p. 17–25. 7 figs., 2 refs. Abstracted from reprint. **DWB** (M01.81 U586sca)—In April a May of 1957, joint scatter propagation studies were made of continuous X- and L-band pu transmissions from Cape Canaveral, Florida, toward Nassau, Bahamas. The ground-t ground signals on the 263 naut mi path were continuously recorded by Univ. of Florida scie tists, and the ground-to-air signals along the path were recorded in NRL's R5D Flying La oratory. The R5D and four other research aircraft measured refractive index and oth properties of the atmosphere along the path. Special meteorological balloon soundings we made by the Air Force Missile Test Center. Three other investigations, carried on sim taneously on the ground, took advantage of the well-monitored radio signals and meteorolo and provided data supplemental to the primary radio-meteorological program. Freque thunderstorms and frontal activity along the path caused rapid fading and multipath in t radio signals. A preliminary summary of the radio signal behavior is given in this artic *Subject Headings:* **1. Radio wave propagation 2. Radio wave scattering 3. Radio meteorolo networks 4. Thunderstorm activity 5. Cape Canaveral, Fla. 6. Nassau, Bahamas.** *Authors' abstract.*

OBSERVATIONAL DATA

See also: **Temp. statistics for Belgium** (Sneyers), 9.9–25; **Arctic weather stations** (Weiss), 9.9–38; **Canadian IGY program** (McRae et al.), 9.9–49; **IGY geomagnetic networks** (Roberts, Knapp), 9.9–50; **Sugar beet growth, Ukraine, U.S.S.R.** (Kekukh, Tregubova), 9.9–84.

9.9–109 551.506:551.521.1(9

*Loewe, F. (*Dept. of Met., Univ. of Melbourne*), **Notes on global radiation in Austra** *Australian Meteorological Magazine*, Melbourne, No. 15:31–41, Dec. **1956.** 6 tables. **DWB** A detailed analysis of 3 yrs (1953–55) of global radiation data from 6 stations (Darwin, G butt, Alice Springs, Guildford, Williamtown and Box Hill) in Australia, using the Robitz bimetallic actinograph. Data are presented as frequencies of daily amounts each month each station, as means for each month and for the first (and last) half of the year as me extremes (maximum and minimum) of daily global radiation, quantities of annual freque of global radiation, and coefficients of correlation between monthly global radiation and clou ness and their ratios to the probable errors. Absolute maxima reach 825–830 cal/cm^2 Garbutt, Guildford and Box Hill. A close (inverse) relation exists between monthly glo radiation and cloudiness (correl. −0.83 and −0.84 at Guildford and Williamtown, respective *Subject Headings:* **1. Global radiation data 2. Global radiation networks 3. Australia.**—*M*

9.9–110 551.506:551.57

Kheĭnson, M. R., **Effekty ot ispol'zovaniia istoricheskogo raskhoda pri opredelenii rasch nykh maksimumov.** [Effect of the use of historical runoff data for determining empir maximums.] *Meteorologiia i Gidrologiia*, No. 7:32–34, July **1956. DLC**—The history maximum levels attained by the Dneiper at Lotzmanska Kamenka for a period of 182 yr reviewed. The maximum during the period occurred in 1931 and the use of the latte determining the statistical parameters is illustrated. *Subject Headings:* **1. Hydrologic tistics 2. Maximum floods 3. Dneiper River.**—*I.L.D.*

9.9–111 551.5:06(0

Malaya. Meteorological Service, **Annual Report, 1956.** Issued Singapore, **1957.** chart (fold.). **DWB** (M06.1/595 M239ra)—A routine annual report of the various activi and organization of the Malayan Meteorological Service. Reports and forecasts for avia and shipping interests, as well as for the general public, are emphasized. The Meteorolog

ffice at Kuala Lumpur which was closed for 3 years was reopened in August 1956 at the ıternational Airport. Ten First Order Stations in the Federation of Malaya and one at ngapore are manned by trained personnel. An upper air research station is maintained at ıya Lebar. Climatological work is also carried on. *Subject Headings:* **1. Annual service ports 2. Malaya.**—*M.R.*

9.9–112 551.506.1:551.515.23(59)

*Vietnam. Direction de la Météorologie, **Tho'i-Tie't Dai-Lu'o'c Nguyêt-San. Résumé ensuel du temps.** [Monthly resume of the weather.] Sept. **1955**–Dec. **1955.** 4 pieces. bout 40 p. each. almost entirely tables. Title-page, introd. or text in Vietnamese and rench. Also annual issue: Dai-Lu'oc Thòi-tiêt, **Résumé du temps.** [Weather review.] 955. 51 p. almost entirely tables. Also, Vietnam. Direction de la Météorologie, **Résumé ı temps en Indochine, 1954.** [Resume of weather in Indochina, 1954.] Pub. **1955?** 47 p. most entirely tables. **DWB**—The monthly reports give very elaborate tabulations of hourly bi-hourly pressure, temp. and dew point, and 3-hourly humidity, cloud, vapor pressure, ilings, visibility and surface winds, and once or twice daily winds aloft for a number of sta- ons in Central and South Vietnam and in Laos and Cambodia. Annual issues give data for merous stations in Vietnam, Laos and Cambodia, in tables of average hourly pressure and mp. for 28 stations, maximum and minimum temp., humidity, vapor pressure, cloudiness, ecip., mean transport of air at the surface, extreme and daily precip., winds aloft, visibility, c., and a chart showing the course of typhoons and tropical storms in the area of Southeast sia and the East Indies. Stations, locations and years of record and a verbal summary of eather are also given. (For earlier annual data reports, *see* 5B–179, Feb. 1954, *MAB.*) *ubject Headings:* **1. Annual meteorological data reports 2. Typhoon track charts 3. Upper r wind data 4. Indochina.**—*M.R.*

9.9–113 551.506.1:551.582.1(642)

*Spanish Morocco. Servicio Meteorológico, **Boletín Mensual Climatológico** [Monthly matological bulletin], June **1957.** 12 p. (unpaged). chart, tables. "Prepared by the eteorological Service of the Division of Tetuan." **DWB**—Each monthly bulletin contains summary of general weather conditions during the month at the main observatory and at the infall stations and in agricultural areas, plus a summary of observations and conditions at the rport Observatory at Tetuan and at the Villa Nador Observatory. Cloud amount, height, sibility and wind frequencies are given for 5 airports, synoptic data for 4 main observatories, mperature data for 75 stations and precipitation data for 105 stations. *Subject Headings:* **Monthly data bulletins 2. Spanish Morocco.**—*M.R.*

9.9–114 551.506.1:551.582.1(664)

*Sierra Leone (and Gambia). Meteorological Service, **Monthly Weather Report,** Dec. **56**–May **1957.** 6 pieces, 4 p. each. Almost entirely tables. At head of title: B.W.A. eteorological Services. **DWB**—Summary of climatic data for 32 stations in Sierra Leone d 12 stations in Gambia, plus additional rainfall data for 72 stations in Sierra Leone and in Gambia. Only about 8 or 10 stations give complete data on wind, cloud amount, pres- re, etc. However, most stations report 90 h and 15 h vapor pressure and relative humidity. *ubject Headings:* **1. Monthly data bulletins 2. Sierra Leone 3. Gambia.**—*M.R.*

9.9–115 551.506.7:551.510.5

*Jordan, C. L. (*Natl. Hurricane Res. Project, West Palm Beach, Fla.*), **A mean atmosphere r the West Indies area.** *U. S. Weather Bureau. National Hurricane Research Project, eport,* No. 6, May **1957.** 17 p. 4 figs., 9 tables, 4 refs. **DWB** (M15.2 U584r)—Mean onthly aerological records for 10 years (1946–55) for Miami, San Juan and Swan Island, levels up to 30 mb (78,000 ft) are summarized and presented in tables and isopleth charts show standard conditions of temp., humidity, and height of pressure surfaces to as great height as data permits. Difference between these results and previous data are shown aphically. *Subject Headings:* **1. Upper air temperature data 2. Upper air humidity data Standard atmospheres 4. West Indies.**—*M.R.*

INSTRUMENT CARRIERS

See also: **Juvenile science books** (Lewellen), 9.9–14; **Arctic weather station** (Weiss), 9.9–38; **Atmos. drag on satellites** (Jastrow, Pearse), 9.9–73; **Satellite obs.** (Tousey), 9.9–74; **Satellite temp. calculations** (Karpenko, Lidov), 9.9–75; **Satellite cooling** (Masson, Gazley), 9.9–80; **Tornado research airplanes, Texas** (Van Thullenar), 9.9–106; **Radiation error of airborne thermometers** (Kachurin), 9.9–122.

9.9–116 551.507.3 :551.5

Arakawa, H. (*Met. Res. Inst., Tokyo*), **Basic principles of the balloon bomb.** *Papers Meteorology and Geophysics*, Tokyo, 6(3/4) :239–243, Jan. **1956.** 2 figs., table, 2 refs., 2 eq **DWB**—The height of 10–12 km has been selected as an appropriate level for drifting of ballo bombs, for this level is the well-defined isopycnic level with maximum westerly current During the winter of 1944–1945, 9000 balloons were sent out to the U. S. from Japan, for t winter season is characterized by heavy baroclinicity in middle latitudes and hence the greate strength of the westerlies is found. Two or three days will be enough to send balloons throu the upper troposphere if the conditions are favorable. (*Same item as* 5E–126, May 195 *MAB.*) *Subject Headings:* **1. Constant level balloons 2. Balloon trajectories 3. Japane incendiary balloons 4. Geostrophic winds.**—*Author's abstract.*

9.9–117 551.507.362.1 :551.521.3

Kupperian, James E., Jr. and Kreplin, Robert W. (*both, U. S. Naval Res. Lab., Was D. C.*), **Optical aspect system for rockets.** *Review of Scientific Instruments*, N. Y., 28(1) :14–1 Jan. **1957.** 8 figs., 20 refs., 6 eqs. **DLC, DGL**—A system for determining the orientation a rocket as a function of time and altitude from photographic records recovered after impa is described in detail. In addition to sun, moon, planets, stars or earth features, the albe of the earth or the night airglow may be used to determine aspect or orientation of the rocket a given instant. Reduction of data by a special mechanical computer has been worked o and the system and a solution of the aspect problem as worked out is described and illustrate The accuracy of the system is also discussed. On a typical flight test, cloud albedo che gave an accuracy of ±3°, and night sky objects the same 3° accuracy. *Subject Headin* **1. Rocket aspect determinations 2. Night airglow.**—*M.R.*

9.9–118 551.507.362.1 :551.5

Chubb, T. A.; Friedman, H.; Kreplin, R. W. and Kupperian, J. E., Jr. (*all, U. S. Na Res. Lab., Wash., D. C.*), **Lyman alpha and x-ray emissions during a small solar flare.** *Jour of Geophysical Research*, Wash., D. C., 62(3) :389–398, Sept. **1957.** 4 figs., 2 tables, 7 re **DLC**—A rocket instrumented to measure Lyman alpha and X-rays was fired while a sm flare was in progress on June 20, 1956. The rocket reached peak altitude about ten m after the flare was first seen visually. An unusually high X-ray flux was observed extend to a short wavelength limit of 3A. Although the flare was still visible in Hα, Lyman alp was not appreciably different from normal. *Subject Headings:* **1. Lyman alpha radiati measurements 2. X-ray measurements 3. Solar flares 4. Rocket observation.**—*Autho abstract.*

INSTRUMENTS

See also: **Frozen soil meas. and instruments, N. Alaska** (Lachenbruch), 9.9–200; **Photo-electric nuclei counters** (Pollak, Metnieks), 9.9–234; **Cloud drop size meas.** (Solov'ev), 9.9–238; **Cloud droplet size meas. techniques** (Mikirov), 9.9–241; **Electric field meters** (Clark), 9.9–305.

9.9–119 551.508

Albrecht, Hans J. (*Melbourne, Australia*), **An electronic actinometer for measureme in narrow spectral ranges.** *Indian Journal of Meteorology and Geophysics*, Delhi, 8(2) :193–1 April **1957.** fig., 3 refs., eqs. **DWB, DLC**—This paper describes the use of capacita bolometers for special measurements of the direct solar radiation. Electronic and opt design factors are outlined, followed by constructional and operational details. Indicat methods for capacitance bolometers are discussed with particular reference to this electro

inometer. *Subject Headings:* **1. Capacitance bolometers 2. Electronic actinometers.**—*thor's abstract.*

9.9–120 551.508.21

Möller, F., **Radiation comparisons at Hamburg.** *World Meteorological Organization, MO Bulletin*, 6(1):13–16, Jan. **1957. DWB**—Report on comparisons made Sept. 1–15, 55 at Hamburg-Fuhlsbüttel Observatory, between 10 radiation instruments, and of a second of comparisons made between 16 instruments in May 15–30, 1956 wherein minor defects covered in the first series of comparisons were remedied. Not only instrument designers experts in radiation were able to discuss freely defects and remedies. Four classes of truments were designated: a) radiation balance meters, b) infrared balance meters, c) pyometers, d) infrared pyranometers. A comprehensive report in German has been issued the WMO Radiation Commission, edited by the secretary, F. Möller. *Subject Heading:* **Radiation instrument comparisons.**—*M.R.*

9.9–121 551.508.25 551.521.326:535.33

Dufay, Maurice, **Étude photoélectrique du spectre du ciel nocturne entre 0,7 et 1,1 μ.** hotoelectric study of the night sky spectrum between 0.7 and 1.1 μ.] *Académie des Sciences, ris, Comptes Rendus*, 244(3):364–367, Jan. 14, **1957.** fig., 4 refs. **DLC**—A Cs-O-Ag otoelectric cell mounted behind a monochromator was used for measuring the 0.7–1.1 μ ion of the night sky spectrum. The apparatus is described and a sample record is presented. e first 50 measurements made with this instrument are found to prove the feasibility of fast asurements which should become, after further improvement, comparable to those normally ained by exposures of more than 20 hrs. The effective range of measurement is also conerably extended toward larger wave lengths. *Subject Headings:* **1. Night sky spectrum Photoelectric monochromators.**—*G.T.*

9.9–122 551.508.26:551.521 551.507.321.2

Kachurin, L. G., **O radiatsionnoĭ inertsii aerologicheskikh termometrov.** [Radiational rtia of aerological thermometers.] *Meteorologiia i Gidrologiia*, Leningrad, No. 8:57–60, 57. 13 eqs., 3 refs. **DLC, DWB**—The author provides a solution to the problem of the iational heating of aerological thermometers and the inertial errors arising as a result of omplete convective heat exchange of the thermometer with its surroundings. In this ution the radiational heat exchange of the thermometer with the surroundings is characterd by the radiational balance of the thermometer surface. The solution of radiation balance iven by the equation

$$T-\theta=\left(T_0-\theta_0-\frac{S'\lambda}{mc}R_0+\gamma\lambda+\frac{S\lambda^2\beta}{mc}\right)e=\frac{r}{\lambda}+\frac{S'\lambda}{mc}R-\gamma\lambda-\frac{S'\lambda^2\beta}{mc},$$

ere m—mass of thermometer, c—specific heat, T—temperature, S—area of contact with atmosphere, θ—air temperature, R—radiational balance of thermometer surface. Special es of this solution are examined, namely: when the radiation balance is equal to zero, when radiation balance alters with time, and when it does not alter with time. *Subject Heading:* **Radiation error of airborne thermometers.**—*I.L.D.*

9.9–123 551.508.26:621.317

Mason, George L., **Fast-response resistance thermometer system for simultaneous ording of air temperatures at a number of separated points.** *American Meteorological iety, Bulletin*, 38(7):391–394, Sept. **1957.** 5 figs. **DWB**—A resistance-thermometer tem is described which permits simultaneous and continuous recording of air temp. at a nber of separated points. Unbalance current in a Wheatstone Bridge network is used as the asure of temperature, and is recorded by a multichannel light-beam oscillograph. The lag fficient of the system is approximately 0.1 second. *Subject Heading:* **1. Resistance thermeters.**—*Author's abstract.*

9.9–124 551.508.53/4

Von Wald, W. A., Jr., **The airdrag anemometer.** *U. S. Naval Research Laboratory, RL Report*, 5044, Dec. 3, **1957.** 13 p. 10 figs. (incl. photos). **DWB** (M055 U586r)—An

airdrag anemometer has been developed for measuring wind speeds from 2 to 100 kn. T anemometer uses differential transformers for detecting N-S and E-W components of the wi force on a small rod and a computer for combining the two components vectorially to g wind speed and direction on linear scales. At wind speeds above 10 kn, accuracy of 1.5 in speed and 5° in direction have been attained. Below 10 kn, the direction errors incre to 10° and speed errors to 2.0 kn. This instrument can readily be modified to provide indi tion of components of wind velocity along N-S and E-W axes or any other perpendicular ax The computation of true wind on shipboard can be accomplished directly by connecting instrument to the compass repeater and pit-log repeater systems of the ship, with the addit of a converter to subtract a voltage proportional to the ship's speed from the fore-and- component of relative wind. Since the exposed part of the instrument is virtually motionl in its operation and the geometry is very simple, it can be readily equipped with electric heat for de-icing under severe spray icing conditions. *Subject Heading:* **1. Anemometers.**—*Auth abstract.*

9.9–125 551.508.

Hayashi, E.; Sekiguchi, Y. and Yada, A., **On the solar radiation error of Japanese rad sonde and its correction.** *Journal of Meteorological Research*, Tokyo, 8(7):425–437, Aug. 19 11 figs., 3 tables, 14 refs., 3 eqs. In Japanese; English summary p. 425. **DWB, DLC**—On the serious systematic errors of radiosondes arises from the effect of solar radiation, and this er becomes very large at high levels. The purpose of the present paper is to determine the amo of radiation error of the Japanese sonde and to set up a correction method for its data. The ti lag error, however, is placed out of consideration. In order to obtain the radiation error, laboratory experiment has been performed, viz., we measured the temperature increment thermometer element by a known radiant energy and assumed that the increment should proportional to $(pV)^{-n}$, where p is the density of air and V the air velocity near the th mometer. The validity of these laboratory data has been compared with the fieldwork fli test and further with the different type sondes (double shield, Finnish and U. S. Weat Bureau). The result obtained in this investigation shows that the solar radiation erro Japanese sonde amounts to 1.1°C, 2.0°C, 3.5°C and 6.9°C at 200 mb, 100 mb, 50 mb 25 mb, respectively, for 60° solar elevation angle. In this manner, we have drawn the diagr of radiation error in which the error temperature of *raob* is plotted as function of press solar elevation angle between 20° and 80°, and ascensional rate of radiosonde. By me of this diagram the correction for routine observation of Japanese sonde has been perfor above 400 mb. *Subject Headings:* **1. Radiation error of radiosondes 2. Japanese radioson** —*Authors' abstract.*

9.9–126 551.508.

*Kachare, N. R.; Mani, Anna; Venkataraman, C. N. and Venkiteshwaran, S. P. *Met. Office, Poona*), **Vertical movements of F-type radiosonde due to collection of snow on balloon fabric.** *Indian Journal of Meteorology and Geophysics*, Delhi, 8(2):218–224, A **1957.** 2 figs., 4 tables, 5 refs. **DWB, DLC**—During radiosonde ascents at Poona on S 28 and 29, 1955 (shortly after thunderstorms), the balloons made descents due to accum tions of snow at about 4.5 km, reascending when the snow melted off (at about 3 to 3.5 k Details of the temp., height, rates of ascent, type of balloon, weight of water on the fal thickness of water film; weight and thickness of snow on balloon, temperatures in the zon accumulation and relation to bright band, and features of dissipation of thunderstorm Poona are tabulated and discussed for this and other similar cases in India. *Subject Headi* **1. Radiosonde balloon descent due to snow 2. Balloon ascension rates 3. Poona, In** —*M.R.*

9.9–127 551.508.822:551.59

Koenigsfeld, L., **La mesure du gradient du potentiel et de la conductibilité par radioso** [Measurement of the potential gradient and conductivity by radiosonde.] (In: Israel, *(ed.)*, **Luftelektrizität im A.G.I.: Bericht über die Tagung in Aachen am 11.-12. Mai 1** pub. Aachen, **1957.** p. 84–90. 8 figs., German and English summaries p. 84.) **DW** The potential gradient measured aloft with radiosondes shows a variation with the air mass

reat diurnal variation. Three typical soundings are given. To have a deeper knowledge of tribution of electrical gradients in the free atmosphere, we have set up, on the same lines, measurement by radiosonde of the conductivity. The first results are given for example. *bject Headings:* **1. Potential gradient measurements 2. Electrical conductivity measurements 3. Radiosonde observations.**—*Author's abstract.*

SYNOPTIC ANALYSIS AND FORECASTING

See also: **Synoptic met.** (Zverev), 9.9–8; **Cloud seeding of orographic clouds** (Thom), 9.9–22; **Hail suppression, Switzerland** (Thom), 9.9–23; **Cloud seeding evaluation** (Thom), 9.9–24; **Seasonal forecasting from periodicities** (Berlage), 9.9–26; **N. Hemisphere pressure charts** (Lahey et al.), 9.9–35; **Frost resistant crops** (Lehmann), 9.9–85; **Fire-weather forecast studies, Canada** (Turner), 9.9–88; **Gas industry and seasonal degree day forecasts** (Smith), 9.9–89; **Vorticity computations** (Hess), 9.9–158; **"Western disturbances," India** (Mooley), 9.9–163; **Typhoon tides** (Arakawa), 9.9–164; **Cold summers, Japan** (Suda), 9.9–189 and 9.9–190; **Albedo of soil** (Suzuki, Maruyama), 9.9–196; **Ice formation on crystals** (Montmory), 9.9–232; **Sunspots and weather, Vienna, Austria** (Cehak), 9.9–291; **Visibility forecasting, Tokyo, Japan** (Yamada), 9.9–298.

9.9–128 551.509.31:551.515.82:551.577

§Smith, Clarence D., Jr. and Wilhelm, Warren K. (*both, Nat. Wea. Analysis Center, S. W. B., Wash., D. C.*), **Precipitation associated with a cold front, December 7–9, 1956.** *Monthly Weather Review*, Wash., D. C., 84(12):452–458, Dec. **1956.** 8 figs., 7 refs., eqs. **WB, DLC**—A synoptic case history study, with emphasis on the thermal advection and other ysical processes related to low level convergence, and applications to forecasting over the ntral States. The particular cold front brought prolonged precipitation to the area from xas to the Great Lakes and New England. Surface and upper air charts, thermal advection, bility index and isotach charts, etc., are indexed. *Subject Headings:* **1. Synoptic case history dies 2. Frontal type precipitation 3. Central States.**—*M.R.*

9.9–129 551.509.31:551.515.82:551.577

§Cole, Robert O. and Lowry, Dale A. (*both, Natl. Weather Analysis Center, U. S. W. B., ash., D. C.*), **Prefrontal rainfall over north central Texas, May 12–13, 1957.** *Monthly Weather view*, Wash., D. C., 85(5):183–191, May **1957.** 10 figs., 13 refs. **DWB**—A detailed synoptic d upper air analysis of a situation on May 12–13, 1957 which gave rainfalls of 2–5 in. in the a near and to the S.W. and N.E. of Dallas, Texas. The surface isobars were curved anticlonically in this area. Upper level cyclonic curvature, however, was indicated. Lifting ocesses, moisture considerations, stability factors (large fluctuations in SHOWALTER's bility Index), upper wind fields, vorticity, low level winds and convergence are all discussed d illustrated. *Subject Headings:* **1. Prefrontal rainfall 2. Synoptic case history studies Central Texas.**—*M.R.*

9.9–130 551.509.317:551.55

Ramage, C. S., **Surface weather chart analysis in low latitudes.** Hawaii Univ. Institute Geophysics, Meteorology Div., Contract AF 19(604)-1942, Scientific Report No. 2, Aug. **57.** 23 p. 8 figs., 2 tables, 13 refs., 2 eqs. **DWB** (M055 H389sc)—Research meteorologists nerally disfavor analyzing the fields of pressure and density in the tropics and convincingly pound the superiority of wind analysis. Nevertheless, most tropical weather stations count arguments for wind analysis and continue analyzing surface charts by means of bars and fronts. One concludes that both systems have their virtues and that, ideally, low itude analysis should combine the two. A scheme is outlined for a master surface wind alysis of the tropics and mid-latitudes using streamlines and isotachs. It incorporates ntal/wind models and center locations derived from a pressure-air mass analysis of the same ta and uses cloud and weather distribution to help delineate the field of divergence. An erational test shows that the scheme could fit into the routine of a tropical station or weather ntral. It might also form a base for attacking the problem of prognosis in the tropics.

Subject Headings: **1. Tropical wind analysis 2. Indirect aerology 3. Surface wind analy 4. Tropics.**—*Author's abstract.*

9.9–131 551.509.3

Berggren, Roy (*Swedish Met. & Hydrological Inst., Stockholm*), **On the accuracy of 5 mb analysis with special reference to numerical forecasting.** *Tellus*, Stockholm, 9(3):323–3 Aug. **1957.** 7 figs., 6 tables, 16 refs. **DWB, DLC**—The result of an analysis experimen discussed. From 29 different analyses of one and the same 500 mb chart, certain paramet were calculated. The standard deviations of the height of the 500 mb surface had an aver value of 15 gdm, determined over an area of 4200×8100 km. The correlation coeffici between the observed changes forecast with a numerical barotropic forecast varied betw 0.53 and 0.77 (24 h), 0.77 and 0.84 (48 h), respectively. Some other verification paramet are given. Calculations of the geostrophic wind are carried through for all analyses, points, over areas and along certain tracks. The deviations due to the differences in analy are sometimes considerable. *Subject Headings:* **1. Upper air analysis 2. Forecast verificat 3. Numerical forecasting.**—*Author's abstract.*

9.9–132 551.509.312:551.

Di Benedetto, F., **Una nota sul vento isallobarico.** [A note on the isallobaric win *Annali di Geofisica*, Rome, 10(1/2):161–163, **1957.** 1 fig., 13 eqs. Italian and English su maries p. 162–163. **DLC**—By considering the horizontal equation of motion due to a sup position of isallobars on a geostrophic wind field, in vectorial form, an expression is obtai for the isallobaric wind which shows that BRUNT and DOUGLAS' formula and ERTEL's form for the isallobaric wind are limiting solutions. The deviation of the isallobaric wind from direction of the isallobaric gradient is equal to the Coriolis parameter. This result is agreement with the one relative to horizontal motion under external friction. *Subject Head* **1. Isallobaric wind.**—*Author's abstract.*

9.9–133 551.509.312:551.556:532.

Hubert, William E. (*Joint Numerical Weather Prediction Unit, Md.*), **A preliminary report on numerical sea condition forecasts.** *Monthly Weather Review*, Wash., D. C., 85 200–204, June **1957.** 5 figs., 8 refs., eqs. **DWB, DLC**—Since July 1956 the Joint Numer Weather Prediction Unit at Suitland, Md., has been making machine forecasts of sea conditi on an operational basis. These prognoses are based on the 1000-mb wind forecasts deri from the two-level, thermotropic model currently in use at JNWP. Two different sea-fore models have been tested to date. The first utilized only the forecast winds at the end of forecast period and, therefore, yielded "fully developed waves." A model incorporat "duration" in a crude manner is now in daily operation. This paper describes both meth compares the numerical results with observed conditions, and outlines future plans. *Sub Headings:* **1. Numerical sea condition forecasting 2. Sea forecast models.**—*Author's abstr*

9.9–134 551.509.312:551.50

Sigtryggsson, Hlynur and Winn-Nielsen, Aksel (*both, Internat. Met. Inst., Stockho* **Experiments in numerical forecasting, using space-smoothed fields.** *Tellus*, Stockh 9(3):296–312, Aug. **1957.** 9 figs., 6 tables, 8 refs., 37 eqs. **DWB, DLC**—A number of exp ments in numerical forecasting, using a technique based on the theory developed by FJØRT have been performed. Sec. A contains the results of making barotropic 500 mb forec for 24 and 48 hrs where the vorticity is advected in a space-smoothed field held constan 12 or 24 hrs. The results indicate that the forecasts in the mean are slightly less accurat measured by the correlation coefficient between computed and observed changes. I pointed out that the root mean square of the computed changes is smaller than for ordi barotropic forecasts, especially for a large area. Sec. B contains the results of an experi to forecast the thickness field between 1000 and 500 mb. The forecasts are based on the th developed by FJØRTOFT (1955). The flow at 500 mb has, however, in these forecasts b forecast with the barotropic model. The errors in these forecasts are of the same orde magnitude as in the barotropic forecasts. In the last part, an attempt is made to relate errors to physical defects of the model, especially the assumption of adiabatic motion. *Su*

adings: **1. Numerical forecasting 2. Space-smoothing techniques 3. Fjørtoft's graphical thod.**—*Author's abstract.*

9.9–135 551.509.313:551.509.5

Johnson, D. H. (*Central Forecasting Off., Dunstable*), **Preliminary research in objective alysis.** *Tellus*, Stockholm, 9(3):316–322, Aug. **1957.** 7 figs., 3 refs., eqs. **DWB, DLC**—mple mathematical surfaces are used to interpolate numerically within two-dimensional works of 500 mb contour heights and winds. The effect on the errors of interpolation of ying the relative weights given to the measured contour heights and winds, the complexity he mathematical surface, and the layout and dimensions of the network are examined. It is cluded that, in areas where observations are reasonably dense, numerical analysis will be least as satisfactory as the currently used subjective graphical method. *Subject Headings:* **Numerical forecasting techniques 2. Objective forecasting methods 3. Interpolation ors.**—*Author's abstract.*

9.9–136 551.509.313:551.571

Lewis, William (*Joint Numerical Weather Prediction Unit, Suitland, Md.*), **Forecasting -mb dewpoint depression by a 3-dimensional trajectory technique.** *Monthly Weather view*, Wash., D. C., 85(9):297–301, Sept. **1957.** 2 figs., 3 tables, 3 refs. **DWB**—Quasi imensional forecasts of 700 mb dewpoint depression are made for periods up to 36 hrs ng observed 700 mb charts and initial and 12-hr forecast vertical motion charts from the WP Unit's "thermotropic model." Results show that moisture can be successfully forecast this technique. Through establishment of a relationship between 700 mb dewpoint de-ssion, instantaneous vertical velocity, and large-scale weather, a forecast scheme is devised ng forecast 700 mb dew point depression and forecast vertical motion from the thermotropic del as arguments. Preliminary results of some experimental forecasts are favorable. *ject Headings:* **1. 700 mb dew point depression forecasting 2. Three-dimensional trajectory ecasting technique.**—*Author's abstract.*

9.9–137 551.509.52:551.555:551.515.2(521.52)

Fujisawa, M., **On the forecasting of wind at Iida caused by typhoon.** *Journal of Meteoro-cal Research*, Tokyo, 9(4):254–258, June **1957.** 4 figs., 4 refs., 5 eqs. In Japanese; English mmary p. 254. **DWB, DLC**—In this paper, the author examined a method of forecasting local wind at Iida caused by typhoon. The procedures are as follows: 1) The proper wind the stationary typhoon is estimated by the statistical relations after K. TAKAHASHI (Eqs. nd 3); 2) Wind velocity v_a with moving typhoon is estimated by Eq. 4; 3) The horizontal tribution of the ratio K of the observed wind velocity v_i to the estimated wind velocity v_a examined. And then, a graphical method is presented to forecast the local wind at Iida mpanying typhoon. *Subject Headings:* **1. Typhoon forecasting 2. Local winds 3. Iida, pan.**—*Author's abstract.*

9.9–138 551.509.54:551.511.32:551.578.13

Kawamoto, T., **On the relation between the distribution of relative divergence and the fall pattern: forecasting of the rainfall amount.** *Journal of Meteorological Research*, Tokyo, :349–355, July **1957.** 5+figs., 2 refs., eqs. In Japanese; English summary p. 349. **B, DLC**—The author discussed the relationship between the distribution of relative rgence and the rainfall pattern over Japan. The fundamental equation is as follows:

$$f(\mathrm{div}\ V_{85} - \mathrm{div}\ V_{50}) \doteqdot \frac{\partial}{\partial t}\delta\zeta + V_{70}\nabla\delta\zeta + \delta V\nabla\zeta_{70},$$

re f is the Coriolis parameter, ζ the relative vorticity and V the wind vector. Subscripts 70 and 50 indicate the quantities at 850, 700 and 500 mb levels, respectively, and

$$\delta\zeta = \zeta_{850} - \zeta_{500}, \quad \delta V = V_{850} - V_{500}.$$

ng the above expression, the author obtained the distribution of relative divergence $V_{85} - \mathrm{div}_{50}\ V$) (Figs. 1, (a)~(d), and it was compared with the rainfall pattern (Figs. 2,

(a)~(d). *Subject Headings:* **1. Relative divergence-rainfall pattern relationships 2. Rain forecasting 3. Japan.**—*Author's abstract.*

9.9–139 551.509.59:551.57

Ray, William E. and Mondschein, Herman F., **Method of forecasting stages on rivers.** *American Geophysical Union, Transactions,* 38(5):698–707, Oct. **1957.** 11 fi 3 refs. **DWB, DLC**—In the course of daily forecasting of river stages at selected points al the Illinois and Mississippi Rivers, it has been noticed that conventional mainstem forecast procedures proved somewhat inadequate in cases where rivers were generally flat. S methods usually involve multiple graphical correlations of two inflow with two outflow st values, or Muskingum routing methods. In the study reported here, an entirely new appro to the problem on the Illinois River was developed. It involved the use of a downstream st parameter as an index of slope and channel storage, and, when used in conjunction w modifications of standard procedures for predicting discharge inflows, could more adequat reproduce the observed stage hydrograph at the upstream point. Results achieved using t new approach are demonstrated in two actual flood rises. *Subject Headings:* **1. River st forecasting 2. Forecasting techniques.**—*Authors' abstract.*

9.9–140 551.509.59:551.311.

Savchenkova, I. E., **Ispol'zovanie indeksa atmosfernoĭ tsirkuliatsii dlia razrab dolgosrochnogo prognoza srokov vskrytiia rek.** [The use of the index of atmospheric circ tion in long range forecasting of river ice breakup.] *Meteorologiia i Gidrologiia,* Lening No. 5:34–37, May **1957.** 3 figs., table, 3 refs. **DWB**—In order to eliminate the subject element in VANGENGEIM's method of classifying the atmospheric circulation for long ra forecasting of river ice breakup, the author presents a method of objectively classifying mospheric circulation types and expressing them by numerical characteristics. With spe reference to the rivers of northeastern U.S.S.R. for which this method is applicable, the aut proceeded to obtain prognostic relationships between synoptic processes occurring du March and April and dates of river ice breakup. An examination of mean AT_{500} maps March and April for the period 1938–1952 showed that different dates of ice breakup w associated with such a map characterized by the presence of two high ridges and two H troughs. The meridional circulation was determined at each station and expressed by index for March. The results of the application of this technique are presented. *Su Headings:* **1. River ice breakup 2. Ice breakup forecasting 3. Synoptic processes breakup relationships 4. U.S.S.R.**—*I.L.D.*

WEATHER CONTROL

9.9–141 551.509.

*American Institute of Aerological Research, Denver, **Analysis of cloud seeding po tialities in the Colorado River Basin of Texas.** Its *Report,* No. 89, Jan. **31, 1951.** 37 p. figs., 6 tables. **DLC** (QC852.A474)—Precipitation data for a score of stations in the Colo River Basin above Austin, Tex., are analyzed for the period 1935–50 to show possible amo (30%) of increase in stream flow, which would result from an estimated 10% increase in pre during the warm season if seeding were properly carried out, and to give a basis for evalua of seeding if and when it is carried out in that area. The basic principles of cloud phys seeding, weather patterns, generator requirements and methods of evaluation are outlined, effects of seeding on the economy of the Basin set forth. *Subject Headings:* **1. Cloud see potentialities 2. Precipitation-runoff relationships 3. Colorado River Basin, Texas.**—*M.*

9.9–142 551.509.616/617:6

Asada, T. (*Faculty of Science, Osaka Univ.*), **Artificial rainmaking in Kansai Dist** *Papers in Meteorology and Geophysics,* Tokyo, 7(3):340–341, Oct. 1956. **DWB**—The artif rain-making in Kansai region had statistically been proved to be effective through a seri tests carried out during the period from Sept. 1951 until Dec. 1953; particularly the experi carried out by AgI smoke generation from the ground at Okinoshima Island during the wi of 1952–1953, which taught us that it could bring about precipitation increase by over if it was made under proper meteorological conditions. Encouraged by the results of

ts, we have taken up the resource zones for water power generation of Kansai Electric wer Company as our target area since the summer of 1953, with the aim to develop the n making tests into commercial use and have installed at various power stations of said mpany, AgI smoke generators of the "Osaka type" electric heating evaporator while the act time of smoking has been decided at the instruction issued by the weather station so at the artificial rain-fall may directly serve to increase the generation of power besides taining experimental results. (For abstract on article from another source, *see* 6J–207, t. 1955, *MAB.*) *Subject Headings:* **1. Artificial precipitation 2. Cloud seeding effectiveness Cloud seeding for water power generation 4. Kansai District, Japan.**—*Author's abstract.*

9.9–143 551.509.617:551.577.11

Bigg, E. K., **The fragmentation of freezing water drops.** *Puy de Dôme Observatoire, lletin*, n.s., No. 3:65–69, July/Sept. **1957.** 2 figs., 4 refs. English and French summaries 65. **DWB**—Experiments are described which are interpreted to mean that many airborne ter drops break into a number of fragments on freezing. About 10–20% break into less an 30 fragments and 0.1% into more. The great majority breaks into a number less than 7, ile 6 and 12 are favored numbers of fragments. *Subject Headings:* **1. Cloud seeding ex- riments 2. Fragmentation of water drops.**—*A. V.*

9.9–144 551.509.617

†Chicago Univ. Dept. of Meteorology, **Cloud physics and rainmaking: research programs the University of Chicago.** Dept. of Meteorology, Univ. of Chicago, Feb. 4, **1957.** 40 p. figs., 44 refs. **DWB** (M09.67 C532c)—A pamphlet telling in layman's language about the actical and the scientific aspects of artificial rain production—the limitations and partial cesses to date, the rain formation processes in ice and water clouds, cloud modification der ideal conditions, physical problems and, finally, the research program on cloud physics gun in 1945) at the Univ. of Chicago where the Thunderstorm Project and more recently nce 1952) laboratory research in flight tests of cloud and precip. parameters, and of seeding nts, has been conducted. The 24 members of the staff are profiled, and a long list of ers published by staff members in this field is appended. *Subject Headings:* **1. Cloud eding 2. Cloud physics 3. Cloud seeding bibliographies. I. Byers, Horace R.**—*M.R.*

9.9–145 551.509.617

Hatakeyama, H. (*Met. Res. Inst.*, Tokyo), **[Announcement on] Report of Rainmaking Japan, 1954–1956.** *Papers in Meteorology and Geophysics*, Tokyo, 7(3):327, Oct. **1956.** VB—This collective report succeeds the **Report of Rain-making in Japan, Vol. 1,** published the Committee for Rain-making in Japan in 1954. This report may not quite cover all the research in rain-making in Japan since 1954, but it comprises most of the fundamental earch and experimental results in the field in the various regions in Japan for the period m the previous report up to time. The contents of this collective report are as follows: **Outline of the Studies on Artificial Precipitation in Hokkaido District; 2) Artificial Rain- king in Tohoku District; 3) Artificial Rain-making in Kanto District; 4) A Brief Account the Research Activities in the Field of Rain and Snow Making in the Chubu District during Period from April 1954, to February 1956; 5) Artificial Rain-making in Kansai District; Researches on Rain-making in Kyushu Area, 1954–1956.** *Subject Headings:* **1. Artificial cipitation reports 2. Japan.**—*Author's article.*

9.9–146 551.509.617:551.574.1

Isono, K.; Fujita, H. and Komabayasi, M. (*all, Geophysical Inst., Tokyo Univ.*), **Change in plets spectrum and water content of a cloud induced by salt water seeding.** *Meteorological iety of Japan, Tokyo, Journal*, Ser. 2, 34(4):177–184, Aug. **1956.** 9 figs., 6 refs. **DWB,** C—An experiment on the cloud modification by spraying NaCl saturated solution directly o clouds was conducted. An atomizer was set at the windward slope of a mountain, and plets of the salt solution were introduced into clouds when the clouds were ascending ng the slope and covered the observation points which were located 1800 m above sea level. rked changes in size spectrum of cloud elements, and the subsequent rapid decrease in id water content caused by onset of precipitation were observed. This result showed that first stage of precipitation was induced within a few minutes by spraying a relatively small

number of NaCl droplets into the cloud which had been colloidally stable. *Subject Headin* **1. Cloud seeding with salt 2. Cloud droplet size distribution 3. Water content of clou** —*Authors' abstract.*

9.9–147 551.509.6

Sugawara, K. (*Chemical Inst., Nagoya Univ.*), **Brief account of the research activities in t field of rain and snow making in Chubu District during the period from April 1954 to Feb. 19** *Papers in Meteorology and Geophysics*, Tokyo, 7(3):336–339, Oct. **1956.** 3 refs. **DWE** The basic research was conducted in the laboratory of K. SUGAWARA and that of I. SANO Nagoya University, while field experiments were conducted with the cooperation of the Chu Electric Power Co., the Tokyo District Meteorological Observatory, the Nagoya Local M teorological Observatory, the Meteorological Research Institute and Nagoya Universi *Subject Headings:* **1. Cloud seeding in Japan 2. Chubu district, Japan.**—*Author's abstract.*

9.9–148 551.50

Itoo, K., **Relation between snow-fall and rice-crop.** *Japan. Meteorological Agen Tokyo, Memoirs of Industrial Meteorology*, 20(2):13–22, Jan. **1957.** 2 figs., 7 tables. Japanese; English summary p. 19.—In spite of the famous proverb: "Much snow brings mu rice-crop," many recent reports of meteorologists have proved the contrary. But the wri treats the same subjects and ascertains that the proverb is true, as long as the snow does exceed a certain limit. *Subject Headings:* **1. Snowfall-rice crop relationships 2. Weather lo** —*Author's abstract.*

STRUCTURE AND PHYSICS OF THE ATMOSPHERE

COMPOSITION OF THE ATMOSPHERE

See also: **Ozone thunderstorm relationships** (Vassy), 9.9–308.

9.9–149 551.510.3:551.501.7

Miller, Lewis E., **Molecular weight of air at high altitudes.** *Journal of Geophys Research*, Wash., D. C., 62(3):351–365, Sept. **1957.** 6 figs., 2 tables, 15 refs., 27 eqs. **DLC** This report describes a method for obtaining the so-called "molecular weight" of air at hi altitudes of the earth's atmosphere above the transition region for the dissociation of molecu into atomic oxygen. A reasonable working model, based upon the ratio of absolute tempe ture to molecular weight T/M, which is proportional to the slope of the $\log_e$ pressure vs altitu curve, is presented. The region considered is from 90 to 600 km, assuming that the co position of the atmosphere is constant up to 90 km. The calculations are based upon perimental data reported by BYRAM, CHUBB, and FRIEDMAN from Aerobee 16, Dec. 1, 19 Since the 1956 Model Atmosphere of the Air Research and Development Command empl a variable scale height gradient with altitude, the diffusive equilibrium and mixing formu of NICOLET and MANGE were modified to obtain the vertical distributions of the vari atmospheric constituents. The mass densities are found by multiplying the number densi by the respective molecular mass of the individual components of the atmosphere. molecular weights at the various altitudes were calculated from the formula

$$\frac{\text{Total mass density}}{\text{Total number density}} \times N_0 \text{ (Avogadro's number)} = \text{Molecular weight.}$$

Knowing the composition of the atmosphere at any altitude, it is possible to determine temperature through the relationship of the scale height to temperature, $H = RT/Mg$. *Sub Headings:* **1. Molecular weight of air 2. Upper atmosphere density 3. Standard atmosph 4. Upper air temperature calculations.**—*Author's abstract.*

9.9–150 551.510.41:546.

Ehmert, A., **Messung kleiner Konzentrationen in der Atmosphäre.** [Measurement small concentrations in the atmosphere.] *Beiträge zur Physik der Atmosphäre*, Frankf a.M., 30(2/3):123–126, **1958.** 13 refs. English and French summaries p. 123. **DWB, DL**

brief survey is presented of the distribution of atmospheric ozone and its connection with roblems of turbulent mass exchange. Further, the methods of measuring small concentra- ons are discussed. It is pointed out that these methods are suitable for the study of locally scaping gases. *Subject Heading:* **1. Ozone concentration.**—*Author's abstract.*

9.9–151 551.510.41:551.577

Utåker, Kåre, **Om den kjemiske sammensetning av nedbören.** [On the chemical mposition of precipitation.] *Naturen*, Bergen, 80(9):551–563, **1956.** 10 figs., table. **DLC**—This is a general review of the network of Swedish chemical precipitation stations stablished in 1948 and which have cooperated with Denmark, England, Finland and Norway nce Nov. 1954. Brief description of instruments is given and some data on geographical istribution of chemicals from precipitation are mapped and tabulated. It is shown that ceanic and human influence on composition of precipitation are the main factors. Atmos- heric and cosmic factors are also considered. The chemicals investigated are: Cl^-, Na^+, K^+, a^{++}, N, NH_4^+, NO_3^-, NO_2^-, Mg^{++}, S, SO_4^{--}, their pH values, and electrical conductivity. *ubject Headings:* **1. Chemical composition of precipitation 2. pH content of precipitation Sweden.**—*W.N.*

ATMOSPHERIC POLLUTION

See also: **Atmospheric pollution control, U.S.S.R.** (Lebedov et al.), 9.9–96; **Public health** (Mancuso, Mordell), 9.9–97; **Aerosols and explosion waves** (Sidorkina), 9.9–157.

9.9–152 551.510.42:533.15

Csanady, G. T. (*New South Wales Univ. of Tech., Wollongong*), **Dispersal of dust particles rom elevated sources. Pt. 1.** *Australian Journal of Physics*, Melbourne, 8(4):545–550, ec. **1955.** 2 figs., 7 refs., numerous eqs. **Pt. 2, Limitations of the approximate theory.** *bid.*, 10(4):558–564, Dec. **1957.** 2 figs., 4 refs., 25 eqs. **DLC**—The equations of SUTTON for ie atmospheric diffusion of gaseous pollutants are extended to the case of particles of ap- reciable free falling velocity with the boundary condition that dust fall rate equals ground vel concentration times free falling velocity. It is shown that the effect of gravitational ettling can be allowed for by (a) substituting the height above ground of the downward eflected plume axis for chimney height and (b) by introducing a factor $\alpha(x,z)$ as a multiplier o the "reflection" term in SUTTON's equation. In Pt. 2 the limits of validity of the approxi- nate solution obtained in Pt. 1 are discussed in detail. This discussion is preceded by a eneralization of the earlier solution and two charts are presented to aid calculation of the mirror image multiplier," the basic function of the approximate theory. *Subject Headings:* **Dispersion of particles 2. Dust dispersal 3. Point source of diffusion.**—*Author's abstracts.*

9.9–153 551.510.42:546.22

Moriguchi, M. (*Met. Res. Inst., Tokyo*), **Atmospheric SO_2 in Tokyo District (Atmospheric ollution, Pt. 2).** *Papers in Meteorology and Geophysics*, Tokyo, 6(2):144–149, Sept. **1955.** figs. (incl. photo), 2 tables, 2 refs., eqs. **DWB**—On examining the correlation of the variance f atmospheric SO_2 observed at each of the six stations in the Tokyo district from Jan. 18–24, 955, the effects of wind direction and wind force on the concentration of SO_2 were found out, nd the correlations of the concentration of SO_2 with atmospheric dust number, and with isibility were obtained. *Subject Headings:* **1. Sulphur dioxide in the atmosphere 2. Wind ffects on sulphur dioxide concentration 3. Tokyo, Japan.**—*Author's abstract.*

9.9–154 551.510.42

Moriguchi, M. and Itoo, K. (*both, Met. Res. Inst., Tokyo*), **Electronmicroscope study of tmospheric pollution (On atmospheric pollution, Pt. 3).** *Papers in Meteorology and Geo- hysics*, Tokyo, 6(3/4):255–260, Jan. **1956.** 9 photos, 6 refs. **DWB**—The atmospheric dust Tokyo was collected on the ground in winter with the jet dust counter and was observed ith the electronmicroscope. In that observation, it was seen that the greater part of samples as constituted from carbon black and also many water-soluble substances of about 1μ or ss were seen in the samples collected from among "smog." *Subject Headings:* **1. Atmospheric ollution 2. Air sampling and analysis 3. Owen's dust counter 4. Tokyo, Japan.**—*Authors' bstract.*

9.9–155 551.510.4

Moriguchi, M.; Itoo, K., Kamiyama, K. et al., **Atmospheric pollution in Tokyo District (On atmospheric pollution, Pt. 4).** *Papers in Meteorology and Geophysics*, Tokyo, 7(3):271–280, Oct. 1956. 10 figs., 3 tables, 4 refs. **DWB**—In order to find a clue to the present situation of the atmospheric pollution in Tokyo, two points near the atmospheric pollution sources in Tokyo city (Kanda and Arakawa) and one in Kawasaki city which seemed to exercise much effect on the pollution in Tokyo city were selected, and the concentration of SO_2, CO_2 and dust in the open air was observed 5 times per day during a week, from February 15–21, 1956. And also, H–CHO and NH_3 in the air were observed at the same time, respectively, in Kanda and Arakawa. Depending on the results obtained, the characteristics of the atmospheric pollution at its source area were investigated. Especially, the SO_2 concentration was compared with the concentration and its variation which were observed at 7 localities in Kanda and others last year. *Subject Headings:* **1. Atmospheric pollution 2. Sulphur dioxide in the atmosphere 3. Toyko, Japan. I. Yano, N. II. Naruse, H. III. Yamaguchi, H.**—*Author's abstract.*

STRUCTURE OF THE ATMOSPHERE

See: **High altitude flying** (Power), 9.9–72; **Upper atmos. research** (Vassy), 9.9–107; **Upper air temp. and humidity data, West Indies** (Jordan), 9.9–115; **High level cyclones** (Orihata), 9.9–162; **Radiation budget N. Hemisphere** (Ohring), 9.9–170.

UPPER ATMOSPHERE—IONOSPHERE

See: **Ionospheric absorption meas.** (Piggott et al.), 9.9–28; **Ionospheric drift meas. techniques** (Beynon, Brown), 9.9–29; **Ionospheric soundings** (Wright et al.), 9.9–30; **Radio noise meas. techniques** (Beynon, Brown), 9.9–31; **Ionospheric manuals** (Beynon, Brown), 9.9–32; **High level turbulence** (Slater), 9.9–208; **Ionospheric drift meas.** (Harnischmacher, Rawer), 9.9–216.

MECHANICS AND THERMODYNAMICS OF THE ATMOSPHERE

See also: **Energy transport and trade winds** (Francis), 9.9–69; **Rainfall forecasting, Japan** (Kawamoto), 9.9–138; **Wind profile above sea** (Lettau), 9.9–214.

9.9–156 551.511:551.558.1:536.2

Stommel, Henry and Veronis, George (*both, Woods Hole Oceanog. Inst.*), **Steady convective motion in a horizontal layer of fluid heated uniformly from above and cooled non-uniformly from below.** *Tellus*, Stockholm, 9(3):401–407, Aug. 1957. 4 figs., table, ref., 20 eqs. **DWB, DLC**—A gravitationally stable fluid layer is heated non-uniformly (sinusoidally) at the bottom (or top) and a thermal convection regime is established. Examples are worked out for cases without rotation, with uniform rotation, and with non-uniform rotation (beta-plane). *Subject Heading:* **1. Convective motion.**—*Authors' abstract.*

9.9–157 551.511.32:551.510.4

Sidorkina, S. I., **O nekotorykh dvizheniiakh aerozolia.** [Some aerosol motions] *Akademiia Nauk SSSR, Doklady*, 112(3):398–399, Jan. 21, 1957. fig., ref., eqs. **DLC**—Discusses the effect of particles in the air on hydrodynamic processes. The modified general adiabatic equation is presented. Such phenomena as shock waves, intense explosions of different geometry, frontal jumps and supersonic motion are mentioned in this short treatment. *Subject Headings:* **1. Hydrodynamics 2. Aerosols 3. Explosion waves.**—*A.A.*

9.9–158 551.511.6:551.509.318:681.1

Hess, Seymour L. (*Dept. of Met., Florida St. Univ., Tallahassee, Fla.*), **A simple analog computer for determination of the LaPlacian of a mapped quantity.** *American Meteorological Society, Bulletin*, 38(2):67–73, Feb. 1957. 7 figs., ref., 6 eqs. **DWB, DLC**—The determination of the LaPlacian of a mapped quantity, such as the geostrophic vorticity, is an important but a time-consuming process. The common procedure involves a number of interpolations and an algebraic computation for each point at which the evaluation is made. A device

resented in which the slow process of interpolation is replaced by the faster and more reliable rocess of measurement of distance between isopleths of the mapped quantity, and the algebraic ılculation is replaced by the rapid, automatic operation of a DC analog computer. The umerical result is presented as the deflection of a millivoltmeter. In practice, the use of this ɔmputer proves to be a rapid, reproducible, sufficiently accurate means of determining the eostrophic vorticity from an analysis of the contours of an isobaric surface. (*Same item as* 5–189, May 1957, *MAB.*) *Subject Headings:* **1. Vorticity computations 2. Analog com-ıters.**—*Author's abstract.*

GENERAL CIRCULATION

See also: **Seasonal forecasting from periodicities** (Berlage), 9.9–26; **Constant level balloons** (Arakawa), 9.9–116; **Jet stream variations, Far East** (Sugimoto), 9.9–217.

9.9–159 551.513.1

Stark, Paul (*Extended Forecast Section, U. S. W. B., Wash., D. C.*), **The weather and ırculation of Jan. 1957: a month with a persistent block in the Gulf of Alaska.** *Monthly Veather Review*, Wash., D. C., 85(1):19–27, Jan. **1957.** 9 figs., table, 13 refs. **DWB, DLC**—week-by-week summary of synoptic conditions, circulation features, and weather over the . S. Record all-time low temperatures were recorded in New England on the 15th and in ıe Pacific Northwest on the 26th and 27th (Missoula, Mont., −33°F; Burns, Ore., −25°F). ll-time snowfall records occurred at Detroit (9″ in 24 hrs), Pendleton, Ore. (17″ on ground), ıd Grand Junction, Colo., 33.7″ in one month. *Subject Headings:* **1. Blocking action 2. Rec-rd low temperatures 3. Record snowfalls 4. United States.**—*M.R.*

9.9–160 551.513.2:551.557.5:551.511

Dedebant, Georges, **Une image hydrodynamique du courant de la haute atmosphère.** Hydrodynamic model of the upper atmospheric current.] *Académie des Sciences, Paris, omptes Rendus*, 243(19):1435–1436, Nov. 5, **1956.** foot-ref., eqs. **DLC**—From equations the circumpolar vortex and of the meridional temperature distribution, a model representing ıe principal features of the planetary jet stream is derived. *Subject Headings:* **1. Jet stream ıodel 2. Hydrodynamics.**—*Trans. of author's abstract.*

9.9–161 551.513.2:551.557.5(54)

Koteswaram, P. (*Met. Off., Calcutta*), **Mean zonal wind circulation over India.** *Indian ournal of Meteorology and Geophysics*, Delhi, 8(3):346–347, July **1957.** 2 refs. **DWB, DLC**—criticism of part of MOOLEY's paper (*see* 8.6–263, June 1957, *MAB*) which claimed that ıere were two wind maxima (jet streams) in the upper troposphere at 31°N and 22½°N at the)0 mb level. These conclusions are based on pibal data which do not have sufficient fre-ıency at high levels, and on radiosonde data for Jodhpur which, according to the author, are ɔt so reliable either. He claims that a single wind maximum should be found at 25° to 27°N, ; appears for cross sections made <10 km where data are more plentiful. Other errors are ɔinted out—also due to scanty data. *Subject Headings:* **1. Subtropical jet stream 2. Upper r winds 3. India.**—*M.R.*

ATMOSPHERIC DISTURBANCES

See also: **Thunderstorm elec. textbooks, Czechoslovakia** (Řihánek, Postranecký), 9.9–7; **Tornado deaths, U. S.** (Linehan), 9.9–27; **WMO Regional Ass'n IV. and Hurricane warning services**, 9.9–53; **Tornado research airplanes, Texas** (Van Thullenar), 9.9–106; **Frontal type precip., Central States, U. S.** (Smith, Wilhelm), 9.9–128; **Prefrontal rainfall, Central Texas** (Cole, Lowry), 9.9–129; **Typhoon forecasting, Japan** (Fujisawa), 9.9–137.

9.9–162 551.515.1:551.510.53:551.511.6

Orihata, J. (*Japan Air Lines, Tokyo*), **High-level cyclones south of the subtropical jet ream.** *Meteorological Society of Japan, Tokyo, Journal*, Ser. 2, 35(1):45–51, Feb. **1957.** figs., 9 refs., 2 eqs. **DWB, DLC**—An example of a high-level cyclone to the south of the aximum westerlies, with its entire life within the network of aerological observations of the

Far East, is investigated. The conditions for the formation of such a high-level cyclone ar found first to be a rapid intrusion of cold air into the upper westerlies from the north and t lie in the dynamic instability of the upper tropospheric westerlies. The observational occur rence of negative absolute vorticity south of pronounced jet streams, in connection with th cutting-off process of a low, is illustrated in the cross section and is reasoned by a perceptibl influence of the vertical motion in changing the vorticity about the vertical. It is also pre sented in terms of the height profiles of selected isobaric surfaces which in the upper low doe not extend down to the lower level. The westerly displacement of the high-level cyclone i mainly dependent on the easterlies prevailing over the Japanese Islands above the level of th tropical tropopause. The thermal structure is studied in the vertical west-east cross section through the center of high-level cyclone. The outstanding example is the formation of a isolated island of warm air below the tropical tropopause due to the descent over a cold cyclonil vortex. A new "false" tropopause is seen to form as the lower limit of such descent. *Subjec Headings:* **1. High level cyclones 2. Vorticity 3. Cyclone formation.**—*Author's abstract.*

9.9–163 551.515.127:551.509(54

Mooley, D. A. (*Regional Met. Centre, Nagpur*), **Role of "western disturbances" in th production of weather over India during different seasons.** *Indian Journal of Meteorolog and Geophysics*, Delhi, 8(3):253–260, July **1957.** 9 figs., 2 tables. **DWB, DLC**—Effect of thes "western disturbances"—which differ considerably from extratropical cyclones—on wide spread or locally heavy rain, cold waves, induced disturbances both at sea level and aloft hot weather in winter months (due to absence of western disturbances, and attending cloudi ness), monsoon activity (extension of moist currents into Kashmir and Punjab during June) increased monsoon activity or shift of axis of monsoon trough to Himalaya foothills are dis cussed. Data and maps for 1945–1955 are used in the many examples given and analyzed *Subject Headings:* **1. Western disturbances 2. India.**—*M.R.*

9.9–164 551.515.2:525.63:551.509.

Arakawa, H., **On typhoon storm tides.** *Geofisica Pura e Applicata*, Rome, 38:231–249 **1957.** 23 figs., 1+tables, refs. **DLC**—After reviewing current theories on synoptic type producing coastal inundations, the author proposed a theory on the dynamics of catastrophi typhoon tides after resonance and hydraulic analogy. As examples, case studies of the storm tides caused by the Muroto Typhoon of 1934 and the 1917 Typhoon are given. Another typ of the storm tide, caused by the crossing of two wave fronts (Inland Sea type), is also discussed Many figures given in this study will help the forecasters to forecast storm tides. *Subjec Headings:* **1. Typhoon tides 2. Storm surge forecasting 3. Typhoon, Muroto (Sept. 1934).**— *Author's abstract.*

9.9–165 551.515.2(51

§*Natário, Agostinho Pereira, **Tufões que assolaram Macau.** [Typhoons that have dev astated Macao.] Macao, Imprensa Nacional, **1957.** 20 p. 8 figs. (some fold.), photos Legends in English and Portuguese for figs. 1–4 given on p. 19–20. At head of t-p: Serviç Meteorológico de Macau. **DWB** (M15.2 N273tu)—From existing records, 119 typhoon could be traced whose centers passed within 80 mi and ravaged the city of Macao. Among th most violent typhoons, those of Sept. 1874, May 1875, Aug. 18th, 1923 and Aug./Sept. 1937 are particularly mentioned for their devastating effect in causing considerable damage to th city and much loss of life. From figures and charts published in the appendix, the followin conclusions could be drawn: a) The normal typhoon period stretches from May to Nov. b) Usually the typhoons come from S.E. direction; c) The precipitation increases 61.4% during the passage of the typhoon and generally it passes south or west of Macao; d) Th strongest winds occur shortly before the passage of the center of the typhoon; and e) Th strongest gusts normally occur after the sudden change of direction of the winds. *Subjec Headings:* **1. Typhoon analysis 2. Typhoon damage 3. Macao.**—*Author's abstract.*

9.9–166 551.515.2

Miller, B. I. (*U. S. W. B., Miami, Fla.*), **On the maximum intensity of hurricanes.** *U. S. Weather Bureau, National Hurricane Research Project, Report*, No. 14, Dec. **1957.** 19 p 8 figs., 2 tables, 11 refs., 3 eqs. **DWB** (M15.2 U5845r)—The minimum pressure that ca

ccur within a hurricane is related to the temperature of the sea surface over which it moves. his is done by making certain assumptions and synthesizing an eye sounding, which is used o compute the lowest pressure of the storm. The validity of the computed sounding is tested n eight hurricanes. A series of composite 200-mb charts is constructed from five of the eight urricanes which reached great intensity to show one synoptic situation which results in naximum deepening. These are contrasted with a similar series of composite charts prepared or storms which reached only minor intensity. *Subject Headings:* **1. Hurricane dynamics . Sea temperature effect on hurricane development.**—*Author's abstract.*

9.9–167 551.515.22

Simpson, R. H. (*U. S. Weather Bureau*), **Some aspects of tropical cyclone structure.** (In: ropical Cyclone Symposium, Brisbane, Dec. 1956, **Proceedings.** Pub. Dec. **1956.** p. 139–57. 14 figs. (incl. photos), 18 refs.) **DWB**—The fact that the internal forces in the hurricane ffect the hurricane's development and movement, and that the microstructural fields cannot e seen in any model based on averages or composites, is emphasized. The structure, cloudiess, rainfall patterns, outflow clouds, the eye of the storm, high level inflow clouds, thermal tructure, circulation patterns in the cyclone, tropopause, etc. are considered and cross sections, harts, cloud photographs and diagrams of all types are included. *Subject Heading:* **1. Tropical yclone structure.**—*M.R.*

9.9–168 551.515.8

*MacHattie, L. B., **Warm frontal passages at Ottawa (Uplands).** *Canada. Meteorological Branch, CIR-2921*, TEC-250, May 8, **1957.** 6 p. 3 tables, ref. **DWB, DLC**—Examination f hourly observations for Ottawa airport shows that cases selected solely on the basis of indshift from easterly to southerly are accompanied by a temperature rise averaging 7°F n winter and 4°F in summer. Correlation with surface charts indicates that in winter most f these windshift cases accompany warm frontal passages and also the converse, that most arm frontal passages give the specified windshift. *Subject Headings:* **1. Warm frontal passages . Wind shift 3. Ottawa, Canada.**—*Author's abstract.*

9.9–169 551.515.8

Undt, W. (*Vienna*), **Der Tagesgang markanter Kaltfrontdurchgänge in Wien.** [The iurnal variation of marked cold front passages in Vienna.] *Wetter und Leben*, Vienna, (3/4):69–72, **1956.** fig., 7 refs. **DLC**—The author discusses the classification of fronts eveloped at Vienna, the characteristics of marked cold fronts, and reviews various studies on he diurnal frequency of cold front passages at Munich (Ungeheuer), etc. This is followed y an attempt to determine when fronts manifest a distinct diurnal frequency in Vienna. On he basis of an analysis of 563 frontal passages over the period 1948–1955, it was found that najority of frontal passages occurred between 1300 and 1900 h. Also the daily variation of ronts by season, the diurnal variations of cold and warm fronts, etc. are discussed. *Subject Headings:* **1. Diurnal frontal variations 2. Cold fronts 3. Vienna, Austria.**—*I.L.D.*

RADIATION AND TEMPERATURE

RADIATION

See also: **Energy exchange of an Antarctic snowfield** (Liljequist), 9.9–42; **Solar energy utilization** (Lauscher), 9.9–54; **Global radiation networks, Australia** (Loewe), 9.9–109; **Lyman alpha and X-ray meas.** (Chubb et al.), 9.9–118; **Night sky spectrum** (Dufay), 9.9–121; **Radiation error of airborne thermometers** (Kachurin), 9.9–122; **Ultraviolet sky radiation** (Sekihara), 9.9–302; **Auroral intensity meas.** (Harrison, Jones), 9.9–315; special bibliography on **Cosmic Rays,** p. 1140.

9.9–170 551.521:551.510.53

Ohring, George, **Radiation budget of the stratosphere.** N. Y. Univ. College of Engineerng, Research Div. Dept. of Meteorology and Oceanography, Contract AF 19(604)-1738, cientific Report, No. 1, June **1957.** 42 p. 12 figs., 3 tables, 33 refs., 9 eqs. **DWB** (M055 [532sr)—The radiation budget of the Northern Hemisphere stratosphere is determined for

the months of Jan., April, July, and Oct. Emission of infrared radiation by carbon dioxide, water vapor and ozone is calculated by means of a simple numerical method derived from the radiative transfer equations. Absorption of solar radiation by ozone is taken from published results; absorption of solar energy by water vapor is computed with the aid of an empirical formula. It is found that, in general, radiative equilibrium is not obtained at any latitude. Low latitudes constitute a heat source and high latitudes a heat sink in the stratospheric energy budget. It is shown that carbon dioxide is most important in cooling the stratosphere and that infra-red transfer in the 9.6μ ozone band normally results in a radiative convergence in the stratosphere. Some features of the stratospheric temperature distribution and circulation pattern are inferred from the computed radiation budget and its seasonal variations. *Subject Headings:* **1. Radiation budget 2. Stratospheric radiation 3. Northern Hemisphere.**—*Author's abstract.*

9.9–171 551.521.1

Black, J. N., **The distribution of solar radiation over the earth's surface.** *UNESCO/Arid Zone Research*, 7:138–143, **1956.** fig., 5 refs., 3 eqs. French and Spanish summaries p. 140–143. **DWB, DLC**—The equations expressing the relationships between radiation received at the earth's surface and the duration of sunshine or mean cloudiness are discussed. The equation giving the relationship between radiation and mean cloudiness is used to calculate radiation income at the earth's surface. The errors in the equation are pointed out. Maps showing the annual variation of zones of radiation, greater than 600 gm cal/cm²/day over the entire world are presented. *Subject Headings:* **1. Global radiation distribution 2. Solar radiation-sunshine duration relationships.**—*I.L.D.*

9.9–172 551.521.1:633.71

Thams, J. C. and Zenone, E., **Über Sonnenscheindauer und Globalstrahlung auf der Magadinoebene unter besonderer Berücksichtigung des Tabakanbaues.** [Sunshine duration and global radiation on the Magadino Plain with special reference to tobacco cultivation.] *Landwirtschaftliche Jahrbuch der Schweiz*, Vol. 66, (n.f. Vol. 1):139–180, **1952.** 14 figs. (incl. photos), 4 tables, 8 refs.—This comprehensive study on climatic aspects of the cultivation of tobacco includes a brief description (with photographs) of the topography of the Magadino Plain; a detailed account of the biology of the tobacco plant (*Nicotiana tobacum L.*) and of its economic importance in the Magadino Plain; methods for determining sunshine duration and incoming solar energy; the effective possible and actual sunshine duration in the Magadino Plain, and sun and sky radiation. Data on monthly and annual totals of possible effective sunshine duration, on annual and monthly totals of actual sunshine duration during the vegetation period of tobacco are given in tables and also shown by isolines. *Subject Headings:* **1. Sunshine duration data 2. Global radiation data 3. Tobacco cultivation 4. Magadino Plain, Switzerland.**—*I.L.D.*

9.9–173 551.521.12

*Albrecht, Hans J. and Dingle, Robert, **Measurements of solar radiation at Mawson, Antarctica 1954.** *Geofisica Pura e Applicata*, Rome, 38:222–230, **1957.** 4 figs., 8 refs., 2 tables. English and German summaries. **DLC**—This paper describes solar-radiation measurements taken at Mawson during the first year of operation of this Australian Antarctic base. Following details of the instrument used and a description of the site, the results are presented and discussed. *Subject Headings:* **1. Solar radiation measurements 2. Solar radiation instruments 3. Mawson, Antarctica.**—*Authors' abstract.*

9.9–174 551.521.12:551.581

Neumann, J. (*Met. Service, Israel Ministry of Transport and Communications*), **On the second harmonic of the annual variation of solar radiation and an application of its zeros.** *Research Council of Israel, Bulletin*, 3(4):308–311, March **1954.** Issued June **1954.** table, 6 refs., 12 eqs. Reprinted as *Israel. Meteorological Service, Ser. D, Contributions*, No. 1.—The author examines the latitudinal variations of the semi-annual waves of solar radiation by first deriving the second harmonic coefficient and giving in a table the harmonic of the semi-annual wave of solar radiation for the Northern Hemisphere. Its application to the problem of the annual variation of energy transfer from the oceans and other large bodies of

vater in the middle latitudes is illustrated. *Subject Headings:* **1. Solar radiation variations . Solar radiation distribution.**—*I.L.D.*

9.9–175 551.521.16

Lenoble, Jacqueline, **Sur la variation de couleur de la lumière du jour en fonction de la auteur du Soleil.** [Daylight color variation as a function of height of the sun.] *Académie es Sciences, Paris, Comptes Rendus,* 244(5):647–650, Jan. 28, **1957.** 3 figs., 2 tables, 5 refs. **DLC**—Total and diffuse illumination of a horizontal ground-level surface is calculated for a Rayleigh atmosphere. During the passage of the sun from zenith to horizon, the change in olor of total illumination is little (the dominant color shifts from 573 to 578 mμ and purity rom 13 to 21%). For diffuse radiation, the dominant color shifts from 477 to 570 mμ and urity from 35 to 14%. *Subject Headings:* **1. Daylight illumination 2. Diffuse radiation . Daylight color variations.**—*Trans. of author's abstract.*

9.9–176 535.242:551.521.17

Watanabe, K. and Mottl, Joseph R. (*both, Dept. of Physics, Univ. of Hawaii, Honolulu*), **Vacuum ultra-violet photoelectric photometry with improved resolution.** (In: **The threshold of space,** ed. by M. Zelikoff. N. Y., Pergamon Press, **1957.** p. 151–156. 4 figs., table, 12 refs.) **DLC**—Photoelectric techniques have been used in the vacuum ultraviolet for absorption measurements in order to avoid the uncertainties of photographic photometry. However, the resolution obtained has been limited to about 1 A. In the present investigation it was possible to obtain a resolution of 0.2 A by using an EMI 6262 photomultiplier and an efficient concave grating. Preliminary results, particularly for O_2, as well as the experimental technique will be described. *Subject Headings:* **1. Ultraviolet absorption 2. Photoelectric photometry.**—*Authors' abstract.*

9.9–177 551.521.3

†Makhotkin, L. G., **Priamaia radiatsiia i prozrachnost' atmosfery.** [Direct radiation and transparency of the atmosphere.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.* No. 5:644–657, May **1957.** 4 figs., 3 tables, 14 refs., 19 eqs. **DLC**—The general laws of the variations of direct solar radiation under actual conditions are examined for different atmospheric transparencies. In this manner a factual basis is provided for the characteristics of transparency. A relationship is established between possible daily totals of direct radiation and the intensity of direct radiation for a given atmospheric transparency, and for a given mass. This eliminates known difficulties associated with the calculation of possible totals in, and then dependence upon, atmospheric transparency. *Subject Headings:* **1. Atmospheric transparency 2. Direct solar radiation.**—*Trans. of author's abstract* (*I.L.D.*).

9.9–178 551.521.3

Melnick, Donald A., **Model for logarithmic dependence of transmission of infrared windows.** Operations Research, Inc., Silver Spring, Md., Technical Report No. 49; Contract AF 19(604)-1422, Scientific Report, No. 5, May 10, **1958.** 39 p. 13 figs., 6 refs., eqs.—The logarithmic factor of ELDER and STRONG, in the transmission of the "windows" between infrared water absorption bands, is explained (1) by suggesting that it is proportional to the width of the windows, (2) by showing that this implies an exponential dependence of the absorption constant on wave length, and (3) by demonstrating that this exponential dependence is essentially due to the Boltzmann factor which determines the intensity of the rotational fine structure of the vibrational lines. *Subject Headings:* **1. Infrared absorption spectrum 2. Absorption by water vapor.**—*Author's abstract.*

9.9–179 551.521.3

Melnick, Donald A. and Bragg, J. K., **The scattering of thermal radiation by clouds.** Operations Research, Inc., Silver Spring, Md., Technical Paper, No. 6; Contract AF 19(604)-1422, Scientific Report, No. 2, Dec. 4, **1957.** 24 p. 6 figs., 4 refs., 30 eqs.—This talk is a summary of certain theoretical results on the transmission of thermal radiation. In the first part, a solution to the problem of transmission of thermal radiation through a layer of scattering particles is derived by two approximation methods. The result is given as a function of angle of incidence, and a scattering parameter of the medium. Although approximate, this

solution is more accurate than the precision of measurements which can usually be made i the field or in the laboratory. The second part contains certain practical but less exac approximations necessary to apply these results to the problem of scattering of radiation b clouds. *Subject Headings:* **1. Scattering of radiation by clouds 2. Thermal radiation scatte ing.**—*Authors' abstract.*

9.9–180 551.521.

J. Michalowsky, G. K. and F. Möller, **Die Absorption der Sonnenstrahlung in der wolken freien und bewölkten Atmosphäre.** [Absorption of solar radiation in cloudless and cloud atmosphere.] *Beiträge zur Physik der Atmosphäre*, Frankfurt a.M., 30(1):63–77, **1957.** figs., 5 tables, 24 eqs. German, French and English summaries p. 63. **DWB, DLC**—Th absorption of short wave solar radiation in the cloudless atmosphere as a function of the amoun of water vapor ("absorption function") is evaluated with the aid of HOWARD's measurement The successive pressure broadening of the absorption lines is taken into account by introducin an average half width. To determine the absorption in clouds, the differential equations SCHUSTER-MECKE-ALBRECHT are solved anew. Applying these equations to non-mono chromatic radiation, values of the absorption coefficients for water droplets and water vapo averaged with respect to the solar spectrum, are to be introduced. To this end, one require also a knowledge of the increase in path length of the radiation due to scattering on the clou droplets. To obtain this information a "detour factor" is derived. Furthermore, the absorp tion function mentioned above is used to determine the additional absorption of the ligh reflected diffusely by the clouds when passing the water vapor above the clouds. Finally, certain amount of the diffuse light transmitted through the clouds is absorbed by the wate vapor between earth's surface and cloud ceiling. This amount is similarly taken into accoun by using the absorption function. The total absorption in the presence of clouds can the be determined by combining the individual contributions to the absorption. Such a calculatio is carried out for some examples of clouds and compared with the absorption for a cloudles atmosphere. It is found that the clouds increase the absorption in the troposphere. *Subje Headings:* **1. Atmospheric absorption 2. Absorption by clouds 3. Absorption function.**— *Authors' abstract.*

9.9–181 551.521.31:551.510.5

Sato, T. (*Nagasaki Univ., Japan*), **On the scattering of the sun's ray in the high at mosphere, Pt. 1.** *Meteorological Society of Japan, Tokyo, Journal*, Ser. 2, 33(5):194–204, Nov **1955.** 7 figs., 8 tables, 2 refs., eqs. **DWB, DLC**—The author computed the intensity o scattering at 5000 m level in four wave-length ranges, and obtained the intensity distributio on the blue sky dome. Each of four partial solar radiation energies contained in the wave length ranges $0–0.5190\mu-0.7077\mu-1.0575\mu-\infty$ is equal to one-fourth of the total energy an are denoted by I, II, III and IV. Let h be the sun's altitude, A and θ the azimuth relativ to the sun and the altitude of the portion of sky dome, respectively. The intensity of firs scattering increases with decreasing wave-length for each A and θ, except for $h=0$ and $\theta=0$ where the domain II has the greatest intensity from $A=0$ to $A=120°$, but III in $A=150°$ 180°. For the altitude higher than $h=30°$, the intensity decreases with increasing θ for eac range and A, for $h=0$ in domain I it is greatest at $\theta=30°$ and decreases to both sides from it further in domains II, III and IV it decreases with increasing θ. The conditions of secondar scattering is the same with the primary for $h\geqq 30°$. In $h=0$, the intensity decreases wit increasing in each range and A, and II has maximum for all A and θ. The conditions of th total scattering are identical with the primary. The intensity of total scattering for tota wave-length range decreases with increasing θ for all h. The horizontal intensity due to tota radiation increases with increasing h for each range, and decreases with increasing wav length for $h=0$, but it is inverted for $h\geqq 30°$. *Subject Heading:* **1. Scattering of light in uppe atmosphere.**—*Author's abstract.*

9.9–182 551.521.32

Barbier, Daniel, **Observations de la luminescence atmosphérique nocturne de la rai rouge de l'oxygène.** [Observation of the red line of oxygen in the nightglow.] *Académ des Sciences, Paris, Comptes Rendus*, 244(13):1809–1811, March 25, **1957.** 4 refs. Also his

Interprétation de la luminescence nocturne de la raie rouge de l'oxygène. [Interpretation of the red line of oxygen in the nightglow.] *Ibid.*, 244(15):2077–2080, April 8, **1957.** 2 figs., 7 refs. **DLC**—Nightglow intensity (6300 Å) was measured at a 75° zenith angle in a complete circle. Intensity variations throughout the night are discussed in the first paper. In the second paper an empirical formula is presented which makes it possible to calculate the approximate intensity of nightglow during the earlier part of the night on the basis of ionospheric data. During the later part of the night the analysis of observations is complicated by an additional phenomenon, possibly the invasion of Arctic air. *Subject Headings:* **1. Night airglow intensity variations 2. Night airglow spectrum.**—*G.T.*

9.9–183 551.521.326:535.242

Huruhata, Masaaki and Tohmatsu, Takao, **The transfer problem of nightglow and its applications to photoelectric photometry.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere Research in Japan*, 11(1):11–16, **1957.** 2 figs., table, 8 refs., 3+eqs. **DWB.** Also reprinted as: *Tokyo. Univ. Geophysical Institute, Geophysical Notes*, 10(1), **1957.** Contribution No. 8. **DLC**—Transfer problems of nightglow in the atmosphere are discussed. A theoretical treatment of scattered light applicable for an arbitrary height of the emitting layer, atmospheric conditions (ozone amount, scattering of the air molecule and absorbing matters near the ground), albedo of the ground and height of the observing station is tried. The results in the plane-parallel atmosphere are extended to the case of spherical atmosphere. The numerical results are applied to the determination of the height of the $[O_I]$ λ 5577 emitting layer. From the mean intensity in autumn and winter of 1953 to 1955 in Japan, it is found that the height of the layer will not exceed 150 km, and probably be 100 km in average. The theories are also applied to the criticism of the "two-color method" in photoelectric photometry. The usual and conventional method of the subtraction of background intensity is authorized for ordinary observational conditions. *Subject Headings:* **1. Emission layer heights 2. Spectral line 5577 Å $[O_I]$ 3. Night airglow spectrum 4. Photoelectric photometry.**—*Authors' abstract.*

9.9–184 551.521.61:546.17:535.33

Weissler, G. L., **The absorption of radiation by ion plasmas.** Los Angeles. Univ. of Southern California, Contract AF 19(604)-151, Final Report, Oct. 30, **1956.** 9 p. 4 refs. Mimeo.—Experimental procedures with UV radiation (<800 Å) passing through plasma of a Phillips Ionization Gauge discharge into a vacuum spectrograph, photometric procedures, atomic nitrogen concentrations in discharges, results for neon photoionization, cross sections, absorption by neutral H_2 and by an ion plasma in H_2, are discussed. *Subject Headings:* **1. Ultraviolet absorption by ion plasma 2. Nitrogen absorption in ultraviolet.**—*M.R.*

9.9–185 551.521.63

Colorado. Univ. Dept. of Physics, **Extreme ultraviolet research.** Contract AF 19(604)-631, Final Report, March 1, 1953–Dec. 1, 1956, pub. **1957.** 7 p. 6 refs. **DWB** (M21.63 C719e)—Activities under a contract for extreme ultraviolet research (March 1953–Dec. 1956) involving firing of five rockets carrying spectrographs (two firings successful) are briefly reported. Summing up the results it is stated that the absolute intensity of Lyman-alpha radiation outside the atmosphere is about 3 ergs/cm²/sec; the measured variation of molecular oxygen with height is consistent with theoretical prediction, dissociation being nearly complete at 125 km. *Subject Headings:* **1. Extreme ultraviolet research 2. Ultraviolet radiation measurements.**—*G.T.*

TEMPERATURE

See also: **Temp. statistics for Belgium** (Sneyers), 9.9–25; **Temp. gradient and marine met. obs.** (Houghton), 9.9–70; **Satellite temp. calculations** (Karpenko, Lidov), 9.9–75; **Gas industry and seasonal degree day forecasts** (Smith), 9.9–89; **Temp. effects on metabolism** (Wilson), 9.9–94; **Humidity factors in air mass analysis** (Ozorai), 9.9–289.

9.9–186 519.2:551.524(748)

Preston, F. W. (*Preston Labs., Butler, Pa.*), **A quality control chart for the weather.** *Industrial Quality Control*, 12(10):4–6, April **1956.** 2 figs. **DLC**—Average daily temperature

for Pittsburgh, Pa., airport for 6 yrs (1942–3–5, 1951–2–3) are plotted on scattergram and 3 sine curves, one for average, one for $+2\sigma$ and one for -2σ, are superimposed, showing that 148 points out of 2200 fall outside 2σ (73 above top and 75 below bottom lines). Another chart for 1954 shows only a dozen points out of 365 falling outside 2σ curves, showing that quality control methods apply to weather data if sine curves rather than straight lines are used. Sine curves are based on maximum, minimum and zero points occurring one month after solstices and equinox, and on standard deviation curve inversely proportional to temperature ($\pm 10°F$ in winter and $\pm 5°F$ in summer). *Subject Headings:* **1. Temperature data analysis 2. Pittsburgh, Pa.**—*M.R.*

9.9–187 551.524.32:517.512.2

Bender, K.; Chorus, U.; Nybro, R.; Sanderson, R. and Weiss, I., **Computation of 5-day temperature normals in Western Europe and the Mediterranean areas.** *Geofisica Pura e Applicata*, Rome, 38:265–285, 1957. 6 tables, 5 figs., 6 refs. **DLC**—Using CRADDOCK's method of representing the annual temperature variation by a two-term harmonic form fitted to monthly means, the harmonic coefficients of 63 stations in western Europe and around the Mediterranean Sea, as well as the 5-day normals for 24 Mediterranean stations, were computed and tabulated. In addition, some of the harmonic coefficients were charted and isoplethed, showing very distinctly the influence of continentality and topography. These charts, together with CRADDOCK's charts for northern and northwestern Europe, provide fairly complete coverage of Europe and the Mediterranean area. *Subject Headings:* **1. Temperature normals 2. Annual temperature variations 3. Harmonic analysis 4. Western Europe 5. Mediterranean areas.**—*Authors' abstract.*

9.9–188 551.524.2/3:917.3(73/9)

*Thom, H. C. S. (*Chief Climatologist, Advisory Committee on Weather Control*), **Standard deviation of monthly average temperature degrees F, Jan.–Dec.** Base map by U. S. Weather Bureau. Climatic analysis by H. C. S. Thom. Wash., D. C., U. S. Weather Bureau (1956?). 12 charts, 49×54 cm. Scale 1:10,000,000. Base map by U. S. W. B. On reverse of Jan. and Feb. charts: his **Standard deviation of monthly average temperature.** 12 refs., eqs. **DWB**—Twelve large charts of standard deviation of monthly temp. for the 30 yr period 1921–1950, based on the network of 120 first order stations in the U. S. are presented. The reasons for using the 30 yr period, rather than a longer period which is available for many stations, is explained in the text which appears on the back of the Jan. chart. If a longer period is used, more changes in station location are involved, and every change in location increases the standard deviation, thus introducing a bias. The highest extreme standard deviations occur in north central Montana (Havre) in Jan. and Feb. (>10.5°F) and the lowest in S. Florida and N.W. Washington State in Sept. (<1.0°F). *Subject Headings:* **1. Temperature deviations 2. United States.**—*M.R.*

9.9–189 551.524.3:551.509.33(52)

§Suda, K. (*Forecast Sec., C. M. O., Tokyo*) and Asakura, T. (*Met. Research Inst., Tokyo*), **A study on the unusual "Baiu" season in 1954 by means of Northern Hemisphere upper air mean charts.** *Meteorological Society of Japan, Tokyo, Journal*, Ser. 2, 33(6):233–244, Dec. 1955. 18 figs., 13 refs. **DWB, DLC**—In the early summer or "Baiu" season of 1954, Japan was dominated by abnormal coolness and persistent rain for nearly two months. In the present study, this abnormal weather condition is investigated primarily on the basis of 5-day mean and 30-day mean 500 mb charts in order to explain it in relation to hemisphere pressure distribution. As a result, a world-wide stagnation of pressure pattern with a ridge over the Sea of Okhotsk is found to be responsible for the abnormality in the Far Eastern weather. Furthermore, it is shown that the "North High" situation which characterizes the weather in the Baiu season is closely related to the anticyclogenesis over certain climatologically defined localities and also to the position of the jet stream relative to the Himalayas. The findings for 1954 are then compared with the normal climatological statistics and their applicability to the Baiu season in general is proved. Finally, a hypothesis on the mechanism of the Baiu is proposed. *Subject Headings:* **1. Synoptic studies 2. Cold summers 3. Bai-u 4. Japan.** —*Authors' abstract.*

9.9–190 551.524.3:551.509.33(52)

§Suda, K., **On the unusual coolness of June and July 1954.** *Journal of Meteorological Research*, Tokyo, 8(5):249–253, 1956. 6 figs., 5 refs. In Japanese. English summary p. 249. **DWB, DLC**—The weather condition, which caused an unusual coolness all over Japan in the early summer of 1954, is studied on the basis of 5-day and 30-day mean Northern Hemisphere maps. Formation of an extensive positive pressure anomaly in May around the pole, and its southward movement in the following months, are found to be related to the persistence and intensity of the ridge in the Far East as a cause of the low temperatures. Furthermore, it is revealed that the ridge is not an isolated local phenomenon but constitutes a link of long-wave system over the Eurasian continent which assumes a stationary character in the Baiu season. *Subject Headings:* **1. Synoptic studies 2. Cold summers 3. Bai-u 4. Japan.**—*Author's abstract.*

9.9–191 551.524.36

Longley, Richmond W., **Temperature variations at Resolute, Northwest Territories. Canada.** *Meteorological Branch, CIR-2980*, TEC 257, Nov. 1, 1957. 7 p. fig., table, ref. **DWB, DLC**—From a study of temperature data at Resolute, Northwest Territories, it is shown that in the Arctic regions the time of minimum temperature occurs near the end of Feb. or in March. This delay, relative to the corresponding time in temperate latitudes, is a result of the lack of incoming radiation during the polar night. *Subject Headings:* **1. Minimum temperature anomalies 2. Nocturnal radiation decrease 3. Resolute, Northwest Territories.** —*Author's abstract.*

9.9–192 551.524.36

*Masatsuka, A. and Yonekubo, Y., **On the geographical distribution of minimum air temperature in the late frosty dawn in Nagano Prefecture.** *Journal of Meteorological Research*, Tokyo, 9(6):427–430, July 1957. 4 figs., table, 2 refs., 2 eqs. In Japanese. **DWB**—A statistical mesometeorological study of an inland valley which is by nature a frost-pocket, including a scatter diagram with envelope demarking the confidence limits and regression for latitude and tabular data showing the altitude factor. *Subject Headings:* **1. Minimum temperature distribution 2. Latitude effects on minimum temperatures 3. Nagano Prefecture, Japan.**—*M.R.*

9.9–193 551.524.36(71):551.501.4

Thomas, M. K. and Boyd, D. W., **Standard period heating degree-day normals.** *Canada. Meteorological Div., DIR-2849*, CLI-16, Dec. 3, 1956. 15 p. 3 tables, 3 refs. **DWB, DLC**—"Normal" or mean monthly temps. (1921–50) for 92 Canadian stations are tabulated by provinces, and the "normal" degree days (<65°F), computed according to a formula of H. S. C. Thom (1954) which allows for adjustment during months of mean temp >50°F (when many days are >65°F). The accuracy of this method is shown by a table which gives a comparison of the method used, with the actual degree days computed on a daily basis (Toronto, Halifax and Winnipeg, 1874 to date). *Subject Headings:* **1. Heating degree day data 2. Canada.**—*M.R.*

9.9–194 551.524.4:535.4:551.593.1

Hamilton, R. A., **The determination of temperature gradients over the Greenland Ice Sheet by optical methods.** *Royal Society of Edinburgh, Proceedings*, Sec. A, 64(4):381–397, 1956/1957. 6 tables, 4 refs. **DLC**—The temperature gradients in the lower atmosphere can be directly determined by measuring the optical refractive index of the air. This method is suitable for use on the Greenland ice sheet where errors introduced by water vapor are small, and where the strong solar radiation reflected by the snow surface makes it difficult to measure temperature differences over height differences of about 1 m. The refraction was measured by observing the apparent vertical angle of each of a set of targets at distances up to 4 km from a theodolite. The refraction was found to vary linearly with the distance of the target. The true vertical angle to the targets was determined when a second theodolite was available and reciprocal sights could be taken with it from the site of target to the fixed theodolite. The true vertical angle varied with time due to slow descent of the theodolite as the firn slumped; a

correction for this was made. The standard error of the temperature gradient measurements was about 1.5×10^{-2}C° per m. It is considered that the method could be developed and improved, so that over a range of only 100 m, temperature gradients could be measured to an accuracy of about 0.1°C per m. *Subject Headings:* **1. Temperature gradient 2. Refractive index 3. Greenland Ice Cap 4. Greenland.**—*Author's abstract.*

9.9–195 551.524.4:551.541

Haurwitz, B., **Atmospheric oscillations and meridional temperature gradient.** *Beiträge zur Physik der Atmosphäre*, Frankfurt a.M., 30(1):47–54, **1957.** 20 eqs., 9 refs. German, French and English summaries p. 47. In English. **DWB, DLC**—In order to study the effect of the meridional temperature gradient on atmospheric oscillations of tidal character, an approximation method is used. This method gives the modifications introduced by a latitudinal variation of the equivalent depth if the oscillation is known for a layer of similar, but constant depth. The method is applied to the zonal semidiurnal oscillation. It is found that the effect of such meridional temperature gradients as occur in the atmosphere is small and may be disregarded, except in cases where strong resonance occurs. *Subject Headings:* **1. Meridional temperature gradients 2. Atmospheric oscillations.**—*Author's abstract.*

SOIL TEMPERATURE

9.9–196 551.525:551.521.13:551.509.612

Suzuki, S. and Maruyama, E., **On the temperature rise of the soil coated with carbon black and exposed to the sun.** *Japan. Meteorological Agency, Tokyo, Memoirs of Industrial Meteorology*, 20(2):39–43, Jan. **1957.** 5 figs., 4 tables. In Japanese; English summary p. 43.—The present paper deals with the thermal effect of solar radiation in summer on the soil which is coated with carbon black. Results obtained are as follows: 1) the albedo of the black coated soil surface decreases to $\frac{1}{3}$ to $\frac{1}{7}$ of that of the standard plot; 2) not only does the surface temperature of the coated plot in daytime become about 5 or 6°C warmer than that of the standard plot, but also the maximum and minimum temperatures at the depth of 3 cm become, on the average, about 1°C warmer than those of the standard plot; 3) it can be understood from the photographs that the grass growth in the black coated plot is remarkably greater compared with the standard plot. *Subject Headings:* **1. Soil temperature under coal dust 2. Albedo of soil.**—*Authors' abstract.*

9.9–197 551.525.4

*Chang, Jen-hu, **Global distribution of the annual range in soil temperature.** *American Geophysical Union, Transactions*, 38(5):718–723, Oct. **1957.** 5 figs., 9 refs. **DWB, DLC**—Maps of annual range in soil temperature at 10, 30, and 120 cm depths were constructed, using the data of 780 stations throughout the world. Temperature-range profile charts for 18 stations are presented and briefly discussed. The depth of invariable temperature is about ten m in the tropics, and 15–20 m in middle and high latitudes. *Subject Headings:* **1. Global annual soil temperature distribution 2. Soil temperature profiles.**—*Author's abstract.*

9.9–198 551.525.4

Morais, J. Custodio de (*Coimbra*), **Temperatura do terreno.** [Earth temperature.] *Coimbra. Universidade. Museu e Laboratorio Mineralogico e Geologico, Memoiras e Noticias*, No. 38, **1955.** 7 p. (reprint). 2 figs., 3 tables. French and English summaries p. 6–7. **DWB**—Annual earth temperature variations during 1927–42, and 1943–53 at 3 and 10 m depth are compared and time average isothermal cross sections presented to show gradients. The data were obtained at 9 a.m. at the Geophysical Institute at Coimbra at depths of 0.4, 0.7, 1.3 and 3 m from 1927–42, and also at 6 and 10 m since 1943. Minimum occurs in Jan. and maximum in Aug. in the air, but at 3 m in March and Sept.; at 10 m the minimum is in July and maximum in Jan. (6 months lag). At 15 m depth the temperature is constant. *Subject Headings:* **1. Soil temperature gradient 2. Coimbra, Portugal.**—*M.R.*

9.9–199 551.525.5:633.18:631.67

Kashiwazaki, Kiyoshi (*Utsunomiya Agricultural Highschool*), **The aspect of frozen paddy field in the district around the city of Utsunomiya (1).** *Journal of Agricultural Meteorology,*

Tokyo, 8(1/2):12–13, March 1953. 3 figs. In Japanese; English summary p. 13. **DWB**—The writer extensively studied the frozen state of paddy rice fields in the district around the city of Utsunomiya and classified them. It is observed in this district that the ice columns (frost in the ground) grow abundantly in many places and show various stratifications which the writer calls "stratified columnar ice," the developing stages of which are shown in a fig. *Subject Headings:* **1. Frozen paddy fields 2. Rice paddies 3. Utsunomiya, Japan.**—*From author's abstract.*

9.9–200 536.24:551.525.5:551.508.29

Lachenbruch, Arthur H., **Probe for measurement of thermal conductivity of frozen soils in place.** *American Geophysical Union, Transactions*, 38(5):691–697, Oct. 1957. 3 figs., 7 refs., 8 eqs. **DWB, DLC**—A probe has been used for several hundred determinations *in situ* of the thermal conductivity of naturally frozen and thawed soils, snow, fresh-water ice, and sea ice in northern Alaska. The probe is about 20 in. long, one-quarter in. in diameter, and contains a small bead thermistor that is used as the temperature-sensitive element. Under normal field conditions, conductivity determined with the probe is reproducible within about two %. The absolute accuracy of the instrument is estimated to be within five %. Results obtained with this probe have suggested a modification in design that is expected to offer a practical method for determining simultaneously the thermal conductivity and thermal diffusivity *in situ*. *Subject Headings:* **1. Thermal conductivity of frozen soil 2. Frozen soil measurements 3. Frozen soil instruments 4. Northern Alaska.**—*Author's abstract.*

WATER TEMPERATURE

9.9–201 551.526.6:551.583(266)

Rodewald, Martin, **Die Temperaturen der pazifischen Küstengewässer Nordamerikas von 1920 bis 1955 (Beiträge zur Klimaschwankung im Meere, 8 Beitrag).** [Temperatures of surface waters on the Pacific coast of North America, 1920–1955 (Contribution to the climatic change in the sea, Pt. 8).] *Deutsche Hydrographische Zeitschrift*, Hamburg, 10(4):147–151, Aug. 1957. 3 figs., tables, 5 refs. German, English and French summaries p. 147. **DWB**—This paper presents recent five-year mean values of sea-surface temperatures from the Pacific coast of North America for a period of at least thirty years (including the year 1955). The five-year running means reveal the occurrence of fluctuations rather than the existence of a secular trend. Decreasing temperatures which have been generally observed since the maximum of sea temperature in 1941 made the last ten years from 1946 to 1955 the coldest years since the beginning of the twenties of this century. It seems, however, that at most stations, temperatures already exceeded the minimum. Throughout separate years, a pronounced warming (or a pronounced cooling) of sea-surface water obviously extended over the whole length of the Pacific coast from California to Alaska. The example of 1926 shows that in this case the high temperatures are caused by a worldwide atmospheric circulation anomaly which, in a similar way, accounts for the high values of sea-surface temperatures in the eastern subtropical part of the North Atlantic Ocean. *Subject Headings:* **1. Sea surface temperature variations 2. Climatic changes 3. North Pacific Ocean.**—*Author's abstract.*

9.9–202 551.526.8(477)

Kaganer, M. S., **O termicheskom rezhime rek SSSR.** [The thermal regime of Russian rivers.] *Ukraine. Nauchno-Issledovatel'skiĭ Gidrometeorologscheskiĭ Institut, Trudy*, 4:78–92, 1955. table, 9 figs., 5 refs.—In order to establish types of heat regimes for the rivers of the Ukraine the author, for 40 points evenly distributed over the Ukraine, used the index developed by E. M. Sokolova, namely t_{watei}/t_{arr} and $t_{watei}-t_{arr}$. Type I and IV characterize the rivers of the Ukraine, the former with positive differences t_w-t_a for the entire warm period, the latter with small positive or negative differences t_w-t_a at the beginning and middle of the warm period, and considerable positive difference for the end of the period. The relationships of water to air temperature during the warm season are shown on a graph. A comparison of mean values of t_w/t_a and t_w-t_a for each month with data on mean water temperatures for rivers of a single district with different basin areas (given in a table) reveals that these magnitudes differ sharply in March and Nov. but are extremely close during the remaining months; this is

explained by the fact that a limited area was observed. Maps are presented showing the types of thermal regimes of rivers of the Ukranian S.S.R., water temperatures distribution in May, July and Sept., the dates of transition of water temperature through 4°C in spring, through 10°C in fall, through 4°C in fall, and through 10° in fall. *Subject Headings:* **1. River temperature variations 2. River-air temperature relationships 3. Ukranian S.S.R.**—*I.L.D.*

PRESSURE AND WIND

PRESSURE

See also: **Seasonal forecasting from periodicities** (Berlage), 9.9–26; **N. Hemisphere pressure charts** (Lahey et al.), 9.9–35; **Atmos. oscillations and meridional temp. grad.** (Haurwitz), 9.9–195.

9.9–203 551.542

Mkhitarian, A. M. (*Water Power Inst., Armenian Acad. Sci.*), **O raspredelenii atmosfernogo davleniia na urovne moria.** [On the distribution of atmospheric pressure at sea level.] *Akademiia Nauk SSR, Izvestiia, Ser. Geofiz.*, No. 7:831–834, July **1956.** 3 refs., 14 eqs. **DLC**—A theoretical paper dealing with the problem of calculating the effect of layer of the atmosphere adjoining the earth's surface upon the stationary distribution of atmospheric pressure at sea level. It is generally known that the existing planetary atmospheric layer adjoining the earth's surface influences the formation of pressure fields aloft and at the earth's surface. The problem is solved without neglecting the terms in the equation of FRIDMAN corresponding to vertical velocity and by assuming a very variable coefficient of turbulent mixing which is assumed to increase linearly with altitude. *Subject Headings:* **1. Pressure distribution 2. Pressure at sea level.**—*I.L.D.*

9.9–204 551.547.1

Polli, S., **Il livello del mare quale riferimento altimetrico.** [Sea level as an altimetric reference surface.] *Annali di Geofisica*, Rome, 10(1/2):139–143, **1957.** 13 refs. Italian and English summaries p. 142–143. **DLC**—In altimetric determinations we take as a surface of reference the mean level of the local sea, thought as constant, or the surface of the geoid passing through a fixed point on the crust of the Earth. As the mean sea-level varies in the course of time (at present it increases at the rate of 1.1 cm each ten yrs), the reference becomes meaningless if we do not state: the interval of time out of which we obtained the mean level, the central instant and the vertical movement (i.e., its velocity) of the general mean level (i.e., of all the seas). The terrestrial levelling-mark, too, is liable to slow vertical variations and for this reason the altitudes connected with it also vary in the course of time. Taking this for granted, we suggest considering as reference-surfaces for altimetric determinations, the general mean sea-levels obtained from the successive periods of twenty yrs for each century and to attribute the corresponding general mean levels to the central years of the intervals under study. In this way we could achieve the following fundamental advantages: 1) the level of reference and the altimetric cotes may be exactly determined in space and time; 2) the connection with all the other levelling-marks and points of the terrestrial surface may be exactly determined and 3) the mean levels may be coupled with the climatic measurements which are made on all the Earth and in the same intervals of time. *Subject Headings:* **1. Altimetry 2. Mean sea level.**—*Author's abstract.*

9.9–205 551.547.2:551.501.42

Mattos, Allyrio Hugueney (*Dir. Div., of Cartography, Nat. Geog. Council, Rio de Janeiro*), **Notas sôbre nivelamentos barométricos.** [Notes on barometric altimetry.] *Revista Brasileira de Geografia*, Rio de Janeiro, 17(2):175–192, April/June **1955.** fig., 6 tables, eqs. French, Spanish, English and Esperanto summaries p. 191–192. **DWB**—The author discusses the method for measuring altitude with the aid of mercury barometers and points out that English and American instruments are standardized on the basis of atmospheric conditions which are not valid for tropical countries. Tables containing suitable corrections and a nomogram for

orrection of humidity in barometric altitude are presented. With the aid of the various orrections it is possible to determine altitude within an error of one meter. *Subject Heading:* . **Altimeter corrections.**—*I.L.D.*

9.9–206 551.547.2(521.6)

Tachihira, R., **On the 700 mb height estimated from the data at the summit of Mt. Fuji.** *Journal of Meteorological Research*, Tokyo, 8(12):751–758, Jan. **1957.** 10 figs., tables, 3 refs., eqs. In Japanese; English summary p. 751. **DWB, DLC**—The height of Mt. Fuji is 3775 m nd the annual mean pressure at the summit is about 640 mb. As 700 mb height is routinely stimated by the data at the summit of Mt. Fuji, the estimated 700 mb height was compared vith 700 mb height in free atmosphere, and the results can be seen in Figs. 1–10. *Subject Headings:* **1. Pressure reduction 2. Mount Fuji, Japan.**—*Author's abstract.*

9.9–207 551.547.5

Iida, M.; Nakamura, N. and Kubota, S. (*all, Met. Res. Institute, Tokyo*), **On the mean spectral distribution of the height of 500-mb isobaric surface along the 50°N latitude circle.** *Papers in Meteorology and Geophysics*, Tokyo, 6(3/4):291–295, Jan. **1956.** 5 figs., 3 refs. **DWB**—For the purpose of offering the materials for studying the relation between the various phenomena of different scales, the significance of mean values and the structure of large-scale urbulence in the atmosphere, we calculated the spectral distribution of disturbances in the tmosphere for one-day, and five-, ten-, twenty- and thirty-day mean values of height of iso-aric surface, and investigated the seasonal variation of each region in the spectral distribution. We calculated the thirty-six term Fourier coefficients of isobaric heights along 50°N latitude ircles, using the 500-mb charts in the **Historical Weather Maps of 1949.** *Subject Headings:* . **Upper air pressure variations 2. Isobaric surface height variations.**—*Authors' abstract.*

TURBULENCE AND GUSTINESS

See also: **Turbulence encountered by airplanes** (Heath-Smith), 9.9–78; **Tropical wind analysis** (Ramage), 9.9–130; **Isallobaric wind** (Di Benedetto), 9.9–132; **Rain formation** (Garrigue), 9.9–254.

9.9–208 551.551:551.557:551.510.534/5

Slater, Alan E., **Turbulence above the ozone layer.** *British Interplanetary Society, Journal*, 15(1):1–7, Jan./Feb. **1956.** 3 figs., 19 refs. **DLC**—It has been stated that a winged vehicle traveling through the upper atmosphere between 50 and 80 km will experience turbulence due to convection currents set up by the hot ozone layer at about 50 km. The evidence for this turbulence is examined and found to be contradictory, mainly because temperature data from many rocket ascents do not show a sufficient fall-off of temperature with height to allow convection to develop. Assuming that there is turbulence, the probable pattern of the convection currents is discussed. Uniform heating should give a regular pattern with the spacing between up-currents equal to two and a half times the thickness of the convection layer. Changes of wind with height should cause the vertical currents to be elongated in the direction of the wind shear, so that a vessel flying parallel to the shear could remain in either an up current or a down current for a considerable distance. Finally, the probable speed of the vertical currents is discussed. Their speed would need to attain several hundred m per second to affect noticeably a winged vessel traveling at 6 km per second. Rough calculation shows that, to attain even 100 m per second, an up current would have to rise through 30 km while remaining some 10°C hotter than the surrounding air. Such a large temperature excess appears unlikely. *Subject Headings:* **1. High level turbulence 2. Turbulence above ozone layer.**—*Author's abstract.*

9.9–209 551.551.25

†Van der Hoven, Isaac, **Atmospheric turbulence characteristics at Brookhaven between 3 and 91 meters height.** 96 p. 23 figs., 33 refs., eqs. Thesis (Ph.D.)—Pennsylvania State Univ. Dept. of Meteorology, Jan. **1956.**—A doctoral dissertation based on a study whose aim is to determine the relation between turbulence characteristics and large scale parameters

(stability, short wave radiation, orography, etc.). The data used were from Aug. 1951 to May 1954 on the Brookhaven meteorological tower between 23 and 91 m above the ground and comparative data from Round Hill. Uses of such information in numerical prediction, fallout prediction, design of aircraft, etc. are suggested. Previous research is reviewed, methods of power spectrum analysis outlined and the properties of spectra analyzed with many graphical illustrations. Among the conclusions are: (1) a linear relationship exists between vertical eddy energy and the square of the mean wind speed for wave numbers >4 cycles/km; (2) vertical eddy energy is dependent on the amount of short wave radiation only for the larger eddies (<2 cycles/km) and (3) an increase in short wave radiation increases the vertical eddy energy. *Subject Headings:* **1. Atmospheric turbulence 2. Power spectrum analysis 3. Tower data analysis 4. Brookhaven, N. Y.**—*M.R.*

9.9–210 551.551.5

Clem, LeRoy H. (*U. S. Air Weather Service*), **Clear-air turbulence over the United States.** *Aeronautical Engineering Review*, N. Y., 16(11):63–68, Nov. **1957.** 4 figs., 2 tables, 3 refs. **DLC**—The importance of research in high level (>25,000 ft) clear air turbulence, and the work of Project Cloud Trail, mountain wave turbulence, results (tabulated and discussed), synoptic and meteorological as well as aero-climatological aspects (shown graphically) are reviewed, with conclusion that there is a significant synoptic pattern which would make prediction possible in many cases. Seasonal, regional and jet stream relations are indicated on the basis of 1 year of frequency data for various parts of the U. S. *Subject Headings:* **1. Clear air turbulence frequencies 2. Project Cloud Trail 3. U. S.**—*M.R.*

9.9–211 551.551.8

Monin, A. S., **O turbulentnoĭ diffuzii v prizemnom sloe vozdukha.** [Turbulent diffusion in the air layer near the ground.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofizicheskaia*, No. 12:1461–1473, **1956.** 4 refs., 25 eqs., 4 figs. **DLC**—An investigation of the solutions of the hyperbolic equation of turbulent diffusion in the layer of the atmosphere near the ground under conditions of indifferent stratification. The example studied is the diffusion of smoke of neutral temperature from a smoke tube. A generalized diffusion equation is developed for any temperature stratification of the atmosphere. *Subject Headings:* **1. Turbulent diffusion 2. Diffusion equations.**—*Trans. of author's summary* (*I.L.D.*).

9.9–212 551.551.8:533.15

Monin, A. S., **Poluempiricheskaia teoriia turbulentnoĭ diffuzii.** [Semi-empirical theory of turbulent diffusion.] *Akademiia Nauk SSSR. Geofizicheskiĭ Institut, Trudy*, No. 33(160): 3–47, **1956.** 11 figs. (graphs), table, 13 refs., 88 eqs. **DLC**—A long paper in which the theoretical and semi-empirical solutions of the parabolic equation of diffusion for various types of source are presented. The analogy with molecular diffusion, the basic equations for turbulent diffusion, the solutions for various types of sources, diffusion in an isentropic field of turbulence, diffusion at the ground with no discontinuities in lapse rate, diffusion in a nonhomogeneous thermal layer near the ground, and calculation of the change in wind speed with height are treated in separate sections for each respective model. *Subject Headings:* **1. Turbulent diffusion theory 2. Statistical theory of turbulence.**—*M.R.*

WIND DISTRIBUTION

9.9–213 551.553.22:551.43

Hanyu, J. (*Aomori Agricultural Experiment Station*), **On *Yamase*-winds during the summer season in Aomori Prefecture, 1954.** *Journal of Agricultural Meteorology*, Tokyo, 12(1): 5–8, July **1956.** 2 figs., 3 tables, 3 refs. In Japanese; English summary p. 8. **DWB**—Author investigated the effects of the mountain ranges in Aomori Prefecture to *Yamase*-winds, the prevailing easterlies, which caused the cool weather damage in summer, 1954. Their appearance days were determined by the wind directions of some points and the weather maps and then their mean wind direction at each point was obtained (see Table 2). Their direction formed continuous stream lines deflected by the Ou range and the Tsugaru- and the Shimokita-peninsula ranges of mountain and others. The topography affected not only wind direction but also air temperatures and sunshine, i.e., it is shown that these ranges of mountain provide

barrier for *Yamase*-winds. The duration of sunshine in Aomori Prefecture (on the Sea of pan) in July, 1954 was great in proportion to the cool weather, but on the Pacific coast as short. *Subject Headings:* **1. Orographic influences 2. Yamase winds 3. Aomori Prefecture, Japan.**—*Author's abstract.*

WIND VARIATIONS AND SPECIAL WINDS

See also: **Dry winds bibliog., U.S.S.R.,** 9.9–3; **Energy transport and trade winds** (Francis), 9.9–69.

9.9–214 551.554:551.511.2

Lettau, H., **Windprofil, innere Reibung und Energieumsatz in den unteren 500 m über m Meer.** [Wind profile, internal friction and energy transformation in the lower 500 m er the sea.] *Beiträge zur Physik der Atmosphäre,* Frankfurt a.M., 30(1):78–96, **1957.** figs., 10 tables, 12 refs. German, French and English summaries p. 78. **DWB, DLC**—is shown that an accurate value of the frictionless or geostrophic wind vector (including the ermal wind) can be obtained with the aid of a representative wind profile. Consequently, tailed and accurate pilot-balloon observations made at a single station provide the necessary d sufficient basic data for the computation of the internal frictional force, the boundary ag, and energy transformations in the atmospheric boundary layer. The method has been sted previously in an analysis of the Leipzig wind profile. In the present paper the same ethod is utilized for the analysis of the detailed wind profile measurements over the N.E. tlantic (near the Scilly Islands) reported by SHEPPARD, CHARNOCK and FRANCIS (1952, *see* 1–11, Jan. 1953, *MAB*). It is found that the classical conception of the frictional boundary yer has validity in the baroclinic atmosphere over the sea. The windprofile parameters over a are compared with those over land. The study includes comparisons of eddy viscosity ofiles, the ground drag coefficient, the dissipation of mean motion energy, and estimates of e largest and smallest eddy size of the inertial subrange of the turbulence spectrum. *Subject eadings:* **1. Wind profile above sea 2. Energy transformation 3. Geostrophic winds.**—*uthor's abstract.*

WIND EFFECTS

See also: **Shelter belts, Japan** (Ota, Motoki), 9.9–87; **Numerical sea condition forecasts** (Hubert), 9.9–133.

9.9–215 551.556.3:621.311.24

Aujeszky, László, **A szélsebesség négyzetes és köbös átlagainak kiszámítása energiahasznosítási kérdések megitéléséhez.** [Computation of quadratic and cubic mean values of wind elocity for the estimation of available wind power.] *Idojárás,* Budapest, 55(3/4):79–81, larch/April **1951.** English summary p. 123. **DLC**—Convenient representations of wind nditions by average values of wind velocity are insufficient for the estimation of the available ind power at a given locality, theoretical wind power being proportional to the third power wind velocity, whereas the wind power utilizable in synchronic generators is found to be roportional to the square of wind velocity. Consequently, the necessity of computing uadratic and cubic means of wind velocity is emphasized. *Subject Heading:* **1. Wind power lculations.**—*Author's abstract.*

UPPER AIR WINDS

See also: **Ionospheric drift meas. techniques** (Beynon, Brown), 9.9–29; **Jet stream model** (Dedebant), 9.9–160; **Subtropical jet stream, India** (Koteswaram), 9.9–161; **High level turbulence** (Slater), 9.9–208; **Auroral-geomagnetic relationships, West Central Canada** (Kim, Currie), 9.9–316.

9.9–216 551.557:551.510.535

Harnischmacher, E. and Rawer, Karl, **Ergebnisse ionosphärischer Windmessungen in er E-region.** [Results of ionospheric wind measurements in the E-region.] *Beiträge zur hysik der Atmosphäre,* Frankfurt a.M., 29(4):253–268, **1957.** 13 figs., 4 refs. German,

English and French summaries p. 253. **DWB, DLC**—The ionospheric drift in the E-layer observed with KRAUTKRAMER's fading method. The evaluation is simply based on the media of several successive determinations of the apparent drift-vector. Results in terms of am plitude and direction are given in graphical form from Nov. 1955 until Oct. 1956. *Subje Headings:* **1. Ionospheric drift measurements 2. Ionospheric drift 3. E-region.**—*Author abstract.*

9.9–217 551.557.5:551.513.

Sugimoto, Y., **Fluctuation of jet stream in the Far Eastern Asia.** *Journal of Meteorologic Research*, Tokyo, 9(7):463–466, July **1957.** 8 figs., table, 2 refs. In Japanese, English sum mary p. 463. **DWB, DLC**—The fluctuation of jet stream is connected with the movement frontal zones and is an important factor for route forecast as well as daily weather forecas In this paper the writer studied the following subjects: (1) The mean position of the jet axe in the Far Eastern by the statistical methods, (2) The movement of polar jet and subtropic streams accompanied by the activity of cyclones that pass the neighborhood of Japan, (3) Th height and temperature of the 500 mb surface connected with the jet axes. The period investigation covered the whole winter season from Dec. 1955 to Feb. 1956. *Subject Heading* **1. Jet stream variations 2. Far East.**—*Author's abstract.*

AQUEOUS VAPOR, HYDROMETEORS AND HYDROMETEOROLOGY

HUMIDITY

See also: **700 mb dew point depression forecasting** (Lewis), 9.9–136; **Humidity factors in air mass analysis** (Ozorai), 9.9–289.

9.9–218 551.571:631.6

Laĭkhtman, D. L., **O fizicheskikh printsipakh normirovaniia orosheniia.** [Physic principles of the regulation of irrigation.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz* No. 6:540–546, Nov./Dec. **1955.** 4 tables, refs., 36 eqs. **DLC**—An attempt is made to solv theoretically the problem of the dependence of optimum levels of irrigation upon meteorologic conditions. The problem is reduced to a determination of the turbulent transfer of wat vapor as a function of the active surface under given meteorological conditions. The formu derived for level of irrigation is:

$$\Delta_{\epsilon_s}=S\frac{\alpha}{C_2+L\alpha}\left\{\left[F_0+\frac{\mu L\phi_0}{C_2+L\alpha}\right]\left[1-\frac{y}{1+y}+0.4228\frac{ny}{(1+y)^2}\right.\right.$$
$$\left.\left.+0.2331\frac{n^2y(1-y)}{(1+y)^3}+\cdots\right]-\frac{bL\mu_0}{(1-n)\xi_w}+a\epsilon S-\epsilon'\right.$$

An example of the application of this formula for calculating irrigation levels is given. *Subje Headings:* **1. Irrigation levels 2. Turbulent transfer of water vapor.**—*I.L.D.*

9.9–219 551.571:551.579:551.579

*Shpak, I. S., **Nabliudeniia nad vlazhnosti'iu na stokovykh stantsiiakh v usloviiak kholmisto-morennogo landshafta.** [Humidity observations at runoff stations in a hilly moraine-type terrain.] *Leningrad. Gosudarstvennyĭ Gidrologicheskiĭ Institut, Trudy*, 45(99) 196–232, **1954.** 3 figs., 16+4 tables, 4 refs. **DLC** (GB651.L38)—Results of investigation carried out under the supervision of the author at VNIGL in 1951–1952, of methods of measuring water reserves on water sheds in any soil-ground layer for the construction of wate balance sheets and 2) determination of the surface humidity of small water catchments for th purpose of determining the conditions of water infiltration into the soil. The paper conclude with suggestions and recommendations on the best methods of carrying out such observation in zones of excessive moisture. *Subject Headings:* **1. Soil moisture reserves 2. Excessiv humidity effects on runoff 3. Runoff.**—*A.M.P.*

EVAPORATION AND EVAPOTRANSPIRATION

9.9–220 551.573:581.11

Morais, José Custódio de (*Dir., Geophys. Inst., Univ. of Coimbra*), **Mesures d'évapotranspiration à Coimbra.** [Evapotranspiration measurements at Coimbra.] Coimbra, Tipografia da Atlântida, **1956.** 7 p. fig., 2 tables, 2 refs. **DWB** (M73 M827me)—Preliminary results of evapotranspiration measurements made at Coimbra (Oct. 1955–Sept. 1956) are reported. Measurements in containers with earth covered with grass have not yet produced sufficient data; evaporation from bare soil shows close correlation with global radiation data. *Subject Headings:* **1. Evapotranspiration measurements 2. Coimbra, Portugal.**—*G.T.*

9.9–221 551.573:551.579(611)

*Preziosi, P. C., **Le climat de la Tunisie: évapotranspiration, bilan hydrologique, zones climatiques.** [The climate of Tunisia: evapotranspiration, hydrological balance, climatic zones.] Tunis, **1954.** 7 p. 12 figs., 5 tables. Mimeo. At head of t-p: Service Météorologique de Tunisie. **DWB** (M82.1/611 T926c)—A thorough study of the various elements of the hydrologic cycle important for a study of the evapotranspiration regime in Tunisia. Data for 32 stations are analyzed and presented in tables, on charts, graphs, isohyetal maps, etc. and a more detailed analysis is made for 4 principal stations in Tunisia. Water need, actual precipitation, water deficit, water excess, index of aridity, potential evapotranspiration, actual evapotranspiration, runoff, etc. are among elements treated quantitatively and seasonally. Maps give parameters according to various systems. *Subject Headings:* **1. Evapotranspiration data 2. Climatic zones in Tunisia 3. Tunisia.**—*M.R.*

9.9–222 551.573

Roberts, W. J., **Evaporation suppression from water surfaces.** *American Geophysical Union, Transactions*, 38(5):740–744, Oct. **1957.** 7 figs., 12 refs. **DWB, DLC**—Techniques used for measuring the effect of monomolecular films to suppress evaporation from water surfaces are reviewed. A brief history of chemical studies and field testing of organic compounds is presented. Research in Illinois by the State Water Survey indicates that normal evaporation may be reduced by as much as one-third by efficient use of monolayers. *Subject Headings:* **1. Evaporation suppression 2. Monomolecular film on water surfaces 3. Illinois.**—*Author's abstract.*

9.9–223 551.573(712)

*Sanderson, Marie, **Measuring potential evapotranspiration: Norman Wells, Northwest Territories, Canada, 1949, 1950.** *Johns Hopkins Univ. Laboratory of Climatology, Publications in Climatology*, 7(1):84–90, **1954.** 6 figs., append. p. 92–93. **DWB**—Daily values of computed and measured potential evapotranspiration (2 tanks) temperature and precipitation are given for the summer months. A good general agreement with THORNTHWAITE's formula was found if the length of day factor was used instead of the location of the station at 65°N. The tanks were covered with Kentucky bluegrass. The station lies in a permafrost region. For 1949 report, *see* K–198, Nov. 1950, *MAB.*) *Subject Headings:* **1. Potential evapotranspiration 2. Evapotranspiration data 3. Thornthwaite's method 4. Norman Wells, Canadian Arctic.**—*A.A.*

9.9–224 551.573(51)

Tschu, Kang-Kun and Yang, Jen-Chang, **A study of the evaporation distribution in China.** *Acta Meteorologica Sinica*, Peking, 26(1/2):1–23, **1955.** 8 figs., 13 charts, 25 refs. In Chinese: English summary p. 23. **DLC** (Orientalia)—Various methods of computing evaporation PENMAN, THORNTHWAITE, HAUDE, ALBRECHT, POPOV, WILD, PICHÉ) are described and compared, and the Penman method adopted for calculating the evaporation for China. Values for a number of stations are given in tables and graphs, and monthly and annual charts (with isarithms) presented for the whole country east of the 100th meridian. Lines of future investigation and applications to national problems are considered. A climatic classification based on evaporation is demonstrated. *Subject Headings:* **1. Evaporation in China 2. Evaporation charts 3. Penman's method of evaporation computation 4. China.**—*M.R.* (*Partly from authors' abstract.*)

CONDENSATION

See also: **Deposition definition** (McDonald), 9.9–64; **Icing of aircraft** (Mazin), 9.9–81; **Cloud seeding with salt** (Isono et al.), 9.9–146; **Electrification aerosols** (Gunn), 9.9–306.

9.9–225 551.574

Bigg, E. K. (*Div. of Radiophysics, C.S.I.R.O., Sydney*), **New technique for counting ic forming nuclei in aerosols.** *Tellus*, Stockholm, 9(3):394–400, Aug. **1957.** 4 figs., 6 re **DWB, DLC**—An objective method for measuring freezing nucleus concentration with improv accuracy is described and the results of a series of measurements made on the coastline in a on-shore wind near Carnarvon, Western Australia are given. Fluctuations in ice cryst counts existed which were well beyond the probable experimental error and appeared to independent of weather conditions, except for the occurrence of cirrus cloud. A remote te restrial source or an extraterrestrial source of nuclei is indicated. *Subject Headings:* **1. Freezi nuclei counting techniques 2. Carnarvon, Western Australia.**—*Author's abstract.*

9.9–226 551.574.1:551.578.41:536.4

Bigg, E. K. and Macklin, W. C. (*both, C.S.I.R.O., Radiophysics Lab., Sydney, Australia*) **The temperature dependence of ice crystal forms.** *Puy de Dôme. Observatoire, Bulleti* Ser. 2, No. 3:71–74, July/Sept. **1957.** 2 figs., 5 refs. French summary p. 71. **DWB**—I crystals formed in a cloud chamber may be made to grow to visible size in a slightly supe cooled solution. The form taken by the crystals grown in a solution is apparently related their form in the cloud. Measurements made in this way confirm that needle-shaped crysta are most prevalent at about −7°C. *Subject Headings:* **1. Ice crystal formation 2. Clou chambers 3. Supercooled water.**—*Authors' abstract.*

9.9–227 551.574

Blanchard, Duncan C., **The fingerprints of a storm.** *Oceanus*, Woods Hole, Mas 4(3):21–24, Spring **1956.** photo. **DWB, DLC**—Studies of cloud or raindrop size distributio such as have been made by Woods Hole meteorologists in Harvard and elsewhere, show ho even with the same intensity of rainfall, drop size distributions may be very different, dependi on process of rain formation involved. Thus drop size distributions can be used to identi similar types of rain formation. *Subject Headings:* **1. Cloud physics 2. Drop size distributio 3. Woods Hole, Mass.**—*M.R.*

9.9–228 551.574

Carte, A. E. and Mossop, S. C., **Daily counts of atmospheric ice-forming nuclei ne Swakopmund, South West Africa, during summer 1956–1957.** *Geofisica Pura e Applica* Rome, 38:208–230, **1957.** 4 figs., table, ref. **DLC**—During a period of three months lar variations in the number of freezing nuclei were found in air coming from over the Atlant Ocean. No satisfactory explanation of these fluctuations could be found in terms of loc conditions, the mixing of the surface air with upper air carrying nuclei, or the effect of mete showers. *Subject Headings:* **1. Freezing nuclei 2. Swakopmund, Southwest Africa.**—*Autho abstract.*

9.9–229 551.574.1:551.594.

Gunn, Ross (*U. S. W. B., Wash., D. C.*), **The systematic electrification of precipitati by ionic diffusion.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Pape* No. 42:232–236, Nov. **1955.** fig., 11 refs., 8 eqs. **DLC**—The author's recent investigatio of droplet electrification by ionic diffusion are reviewed. Expressions are given for the e hancement of the equilibrium charge by the motion of the droplet relative to the environme It is shown that simple ionic diffusion accounts for the free positive charge usually observ on mist and light rain. An exact solution of the diffusion equations leads immediately useful relations for the combination coefficients of ions and droplets. These agree well wi observation. Hyperelectrification of droplets by ionic diffusion in superposed electric fiel is considered. Electric fields can profoundly modify the relative conductivities of the positi and negative ions near electrodes or cloud surfaces and, thus, greatly enhance the charg transferred to a droplet. Under disturbed weather conditions, the estimated charges a

mewhat larger than those inferred from droplet measurements made on the ground under underst orms. The sign of the charge placed on droplets near the Earth's surface by hyper-ctrification is opposite to that of the C. T. R. WILSON effect and, hence, tends to reduce the pressed electric field. *Subject Headings:* **1. Electrical charges on drops 2. Ionic diffusion clouds.**—*Author's abstract.*

9.9–230 551.574.1:551.578.41

Lindenmeyer, C. S.; Orrok, G. T.; Jackson, K. A. and Chalmers, B. (*all, Harvard Univ.*), **ıte of growth of ice crystals in supercooled water.** *Journal of Chemical Physics*, 27(3):822, pt. **1957.** ref., fig. **DLC**—The results of recent laboratory experiments are reported briefly d compared with the theory advanced by HILLIG and TURNBULL. The crystallization locity was found to depend on whether the ice is growing freely in water or on a solid surface, d on the properties (possibly thermal diffusivity of the solid. Ice grows freely, much more wly than it does on a glass surface, while growth is significantly faster on brass. These sults suggest that the rate of growth in water is limited by the conduction of latent heat of sion into the liquid for free growth and into the liquid and solid for growth on a surface, the ster growth in the latter case being a result of the proximity of a heat sink. Measurements capillary tubes are influenced by the thermal properties of the tube and therefore do not present any inherent property of the liquid. The expression obtained by HILLIG and TURN-LL is not as general as has been believed. (*See also SIP* 13603.) *SIPRE abstract 15802. ubject Headings:* **1. Ice crystal growth rate 2. Ice crystal formation in supercooled water Ice crystal formation on various surfaces.**

9.9–231 551.574.1

†Lodge, James P. and Tufts, Barbara J. (*both, Dept. of Meteorology, Chicago Univ.*), **Tech-ques for the chemical identification of micron and submicron particles.** *Tellus*, Stockholm, 2):184–190, May **1956.** 5 figs. (incl. photos), 28 refs., eq. **DLC.** Also in: Conference on e Physics of Cloud and Precipitation Particles, Sept. 1955, **Proceedings.** pub. N. Y., rgamon Press, **1957.** p. 43–46. 18 refs. **DLC** (QC921.5.U5), **DWB**—A detailed descrip-n is given of the gelatin, Millipore and electron microscope techniques utilized for identifying emically micron and submicron particles. The applications of these methods to a study sea salt particles are discussed on the basis of a review of the literature. *Subject Headings:* **Chemical identification of small particles 2. Sea salt particles.**—*I.L.D.*

9.9–232 551.574.1:551.509.67

Montmory, R. (*CNRS Thermodynamic Lab. Clermont-Ferrand*), **Congélation de l'eau ırfondue sur une surface cristalline.** [Freezing of supercooled water on a crystalline surface.] *uy de Dôme. Observatoire, Bulletin*, Ser. 2, No. 4:126–147, Oct./Dec. **1956.** 22 figs., table, refs. French and English summaries p. 126. **DWB**—Report on elaborate experiments to e what actual processes are involved in freezing of supercooled water on crystals of Mica, pI_2, AgI^{β} and AgI^{Γ} and silver. Microphotographs (100×enlargement) show the orientation the epitaxy or ice formation in relation to the orientation of the nucleating crystal. It is ncluded that the nucleus does not need to resemble an ice crystal in form to be effective ilver worked just as well as AgI), and that 2 kinds of active nuclei do not interfere with each her. Data are given for each type of nucleating agent and conditions in the experiment, olecular structure, explanation of results, etc. set forth and illustrated. *Subject Headings:* **Ice formation on crystals 2. Nucleation of supercooled water 3. Epitaxy 4. Silver iodide ıcleating process.**—*M.R.*

9.9–233 551.574.1:551.588.2

Ohtaki, Takeshi (*Geophys. Inst., Faculty of Sci., Tohoku Univ.*), **A study of cloud drops on e mountain.** *Tohoku Univ. Sendai, Japan, Science Reports, 5th Series, Geophysics*, 9(1):22–, July **1957.** 8 figs., 3 tables, 6 refs. **DWB, DLC**—Cloud drops were collected at various vels on the mountain and were examined electron-microscopically. The results show that rops containing sea salt nuclei grow, in general, larger than those containing other nuclei. t higher levels of mountain, more sea salt nuclei are observed than at lower levels, but the ze of nuclei decreases with increase of height. Salinity of water in clouds, which is estimated

from cloud drops and nuclei, increases with height. This tendency is also observed in chlo rinity of snow and rime collected in winter. *Subject Headings:* **1. Sea salt nuclei 2. Nucle growth 3. Altitude effects on nuclei 4. Nuclei and clouds.**—*Author's abstract.*

9.9–234 551.574.1 :551,508.91 :551.593.1

Pollak, L. W. and Metnieks, A. L., **The influence of scintillation on the measurement o extinction with the photoelectric nucleus counter at very low concentrations.** *Geofisica Pura Applicata*, Rome, 38:204–207, **1957.** 2 refs., table. German and English summaries. **DLC**— The variation of the initial setting of the galvanometer pointer when pure air, or air containin only few nuclei, is adiabatically expanded in the fog-tube of the photo-electric nucleus counte is described and explained by changes of the optical density of the air-column expansion The effect of this scintillation, which interferes with the measurements of the extinction a very low concentrations, can be eliminated either by using very narrow beams of collimate light in the illuminator of the counter or by selecting a light beam diameter so much smalle than the diameter of the sensitive surface of the photocell, or of its diaphragm if used, that th variations of the light beam due to scintillation are kept within the boundary of the sensitiv surface. *Subject Headings:* **1. Photoelectric nuclei counters 2. Scintillation influence o extinction measurement.**—*Authors' abstract.*

9.9–235 551.574.

Rooth, C. (*International Met. Inst., Stockholm*), **On a special aspect of the condensation proc ess and its importance in the treatment of cloud particle growth.** *Tellus*, Stockholm, 9 (3) :372–377 Aug. **1957.** 3 figs., 8 refs., 19 eqs. **DWB, DLC**—Available data on the rate of exchange o molecules between liquid water and vapour in contact with it are put in relation to atmospheri condensation and evaporation processes. It is shown that this exchange process exerts quenching action on the rate of growth of small droplets that should contribute to the formatio of a broad size spectrum. Surface films may enhance the effect considerably. Experimenta data are needed to finally decide the meteorological significance of the effect. *Subject Heading* **1. Condensation processes 2. Drop growth.**—*Author's abstract.*

9.9–236 551.574.1 :551.578.4

Roulleau, Maud, **Températures privilégiées de congélation des gouttes d'eau surfondue** [Preferred temperatures of the freezing of supercooled water drops.] *Académie des Science Paris, Comptes Rendus*, 244 (5) :644–647, Jan. 28, **1957.** fig., table, 2 refs. **DLC**—W. Ra has established three temperatures between 0 and −20°C at which freezing nuclei show max mum effectiveness (−4, −11 and −20°C). The author of this article investigated (in lab oratory conditions) the effectiveness of freezing nuclei between −20°C and the temperatur of spontaneous freezing (−24 to −40°C, depending on drop size) and found six temperature at which freezing nuclei show maximum effectiveness, namely −20, −22.5, −25, −28, −3 and −32.5°C. The equipment used in the study is described. *Subject Headings:* **1. Freezin nuclei 2. Nuclei and temperature.**—*G.T.*

9.9–237 551.574.1 :551.578.4

Schaefer, Vincent J. (*Munitalp Foundation, Inc.*), **The formation of large ice crystal in a supercooled film (Simple experiments in atmospheric physics, Pt. 8).** *Weatherwis* Boston, 10 (2) :44–46, April **1957.** 3 photos. **DWB**—A method is described (and the result illustrated) for creating large artificial ice crystals on plastic film in a cold chamber by super cooling water on the film and allowing foreign particles to nucleate the supercooled wate Sometimes ice crystals 10″ across can be created by melting any competing crystals with th warmth of the finger, so the one large crystal can spread. The crystals look like those whic appear on window panes. *Subject Heading:* **1. Ice crystal formation on supercooled film** —*M.R.*

9.9–238 551.574.1 :551.508.7

Solov'ev, V. A., **Ob odnom metode izmereniĭ zariadov i razmerov kapel' tumanov.** [method of measuring charges and sizes of fog droplets.] *Leningrad. Glavnaia Geofizicheskai Observatoriia, Trudy*, 58 (120) :31–41, **1956.** 10 refs., 6 figs., 2 tables, 5 eqs. **DLC**—Th

paratus for measuring the charge and size of fog droplets is based upon the principle that ely-falling, charged fog droplets will fall in a zig-zag path in an electric field which varies intensity, consistency and magnitude. From the length of the zig-zag, its amplitude and period, the horizontal and vertical velocity components of the droplets can be determined. ne radius of a drop is determined from the vertical velocity of movement emitting from the tion of gravity and its charge is determined from the horizontal velocity component. A tailed description of the apparatus, including diagrams and a photograph, the equation for easuring charge and magnitude and experimental data are presented. The latter include aphical representation of the trace of droplets obtained from a fog with artificial and natural arges, and numerical data on size and charge. *Subject Headings:* **1. Cloud drop size measurement techniques 2. Cloud drop charge measurement.**—*I.L.D.*

9.9–239 551.574.1:551.46

Toye, M. J., **Fragmentation des noyaux salins par dessiccation.** [Fragmentation of line nuclei by desiccation.] *Puy de Dôme. Observatoire, Bulletin*, Ser. 2, No. 4:148–151, ct./Dec. **1956.** 7 refs. French and English summaries p. 148. **DWB**—Experiments, scribed in detail, were performed in the lab to test TWOMEY's (*see* 7.8–191, Aug. 1956, *MAB*) eory as to whether or not successive moistenings and dryings of saline (NaCl) nuclei of 5–20μ ameter resulted in loss of mass of the nuclei. After 1000 rehumidifications and desiccations 7 droplets, no apparent loss of volume was detected except in one instance, though tiny iclei were provided for condensation in the chamber during supersaturation. Similar results curred when drops of sea water, with a variety of salts, were given the same treatment. he loss of mass corresponds to 1μ or less diameter or to 10^{-14} to 10^{-18} g loss, which is in keeping ith TWOMEY's theory for nucleating particles for a 11% supersaturation ($>10^{-18}$ g). If 100 re emitted at each desiccation, the loss each time would be 10^{-16} g. *Subject Headings:* **1. Saline uclei fragmentation. I. Twomey, S.**—*M.R.*

9.9–240 551.574.11:551.594.12

†Luchak, George, **Theory of the electric charge distribution of monodispersed lightly harged aerosols of spherical particles coagulating in a bipolar ionized atmosphere.** *Journal Colloid Science*, 12(2):144–160, April **1957.** fig., table, 17 refs., 45 eqs. **DLC.** Reprinted Canada. *Suffield Experimental Station, Ralston, Alberta, Suffield Technical Paper*, No. 66. **WB**—Equations describing the changes with time of the electric charge distribution of agulating aerosols are solved for lightly charged systems. The solutions are compared with perimental data from the literature on the electric charge distribution of initially uncharged mmonium chloride aerosols and good agreement is obtained. The theory is used to describe ualitatively the change in electric charge distribution of silica dusts previously studied perimentally by Gillespie. *Subject Heading:* **1. Electrical charges on aerosols.**—*Author's stract.*

9.9–241 551.574.12:551.508.79

Mikirov, A. E., **Ob izmerenii spektra raspredeleniia chastits v oblakakh i tumanakh.** Measurement of the distribution spectrum of particles in clouds and fogs.] *Akademiia Nauk SSR, Izvestiia, Ser. Geofiz.*, No. 4:512–515, **1957.** 6 figs., table, 5 refs. **DLC**—The author escribes a photoelectric method for measuring the spectrum of distribution of the dimensions particles in clouds and fogs. It is based upon the use of dark field and the indices of dispersion of transparent spherical particles. The optical system consists of a light source diaphragm and lenses (illustrated in a diagram) and produces a bundle of parallel rays of light required diameter. These rays enter the area of investigation and are covered by a black reen behind which a cathode photomultiplier is situated. In case no particles are present the light beam, the light is blocked by the black screen and does not infringe upon the notocathode. The method of measurement and relevant equations and results of measurement are presented. *Subject Heading:* **1. Cloud droplet size measurement techniques.**—*I.L.D.*

9.9–242 551.574.12

Schotland, R. M., **Droplet collision efficiency.** N. Y. Univ. College of Engineering. esearch Div. Dept. of Meteorology and Oceanography, Contract AF 19(604)-993, Final

Report, May **1957.** 54 p. 14 figs. (incl. photos), table, 17 refs., eqs.—An investigation by modeling techniques has been made of the collision between cloud drops of equal size in the range 11–22 microns diameter. It was found that such drops will collide with an initial vertical separation as large as 20 drop radii and an initial horizontal separation of approximately 0.3 drop radii. The approach velocity of the two drops averaged over a vertical separation of 20 radii is nearly constant at 0.1 of the terminal velocity of the drop. An analysis was made of the collision rate between drops of equal size under the assumption that the drops are located randomly in space. It is shown that the collision rate is proportional to the square of the ratio of cloud liquid water content to drop size. *Subject Heading:* **1. Droplet collision efficiency** —*Author's abstract.*

9.9–243 551.574.41 :551.501

*†Shaw, Robert H., **Research directed toward the "Observation of dew deposition on various types of cover."** Iowa State College. Agronomy Dept., Contract AF 19(604)-589, Final Report, (**1955**). 60 p. 22 figs., 15 tables, 22 refs., eqs. **DWB**—Detailed data obtained during 1953 and 1954 crop seasons at Iowa State College, Ames, Iowa, with a Duvdevani dew gage, and in 1954 with a Wallin-Polhemus recorder, are presented and discussed. The sites, equipment, etc. are shown in photographs and described, and comparisons for effect of air temperature, relative humidity, wind radiation, cloud cover, air masses and different types of crops or cover made with respect to time of dew formation and intensity of deposit. Correlation between duration on gage and on crops, grass, etc. ranged from +82 to +98. Lowest correlation was in oats; highest on broad leaved crops. Dew usually occurred above 85% R.H., but at times with lower humidity. Deposits almost always began early in the evening and maximum amounts occurred at sunrise. They seldom occurred with Beaufort 3 wind. Correlation coefficients and regression lines are shown for each comparison. A list of 2 references supplement the **Bibliography on Dew** published in Vol. 3, No. 4, 1952, *MAB*. *Subject Headings:* **1. Dew measurement techniques 2. Dew correlations 3. Dew data 4. Ames, Iowa.**—*M.R.*

FOG

9.9–244 551.57

Whittingham, H. E. (*Div. Met. Off., Brisbane*), **Arctic sea-smoke in Southern Queensland.** *Australian Meteorological Magazine*, Melbourne, No. 14:53–55, Sept. **1956.** 5 refs. **DWB**. Also: Loewe, F. (*Dept. of Met., Univ. of Melbourne*), **Arctic sea-smoke in low latitudes.** *Ibid.*, No. 16:45, March **1957.** **DWB**—Sea smoke, which is rare in tropical or subtropical waters, was observed on July 1, 1956 at 07 h at Palm Beach (28°7'S) over the Pacific. The fog was only a few feet thick for half a mile from the shore and there was evidence of convective cells. Wind was W force 2, a superadiabatic lapse rate extended up to 4700 ft (at 14 h), air temp. was 37°F and sea temp. 66°F. Vapor pressure difference was 14 mb (PHIL CHURCH gave 5 mb as minimum difference). Other instances are cited. LOEWE comments on several other cases of Arctic sea smoke in southerly latitudes, particularly one on Feb. 9, 1934 (*A.M.S. Bulletin*, 15:146, **1934**) when the air-sea temp. difference was 45°F over the Gulf Stream 100 mi east of Cape Hatteras, N. C. This extreme case gave rise to heating of 2°F per hour extending to at least 20,000 ft. *Subject Headings:* **1. Arctic sea smoke 2. Sea smoke in tropics 3. Palm Beach, Queensland 4. Gulf Stream, N. Atlantic.**—*M.R.*

9.9–245 551.575.1 (545

*Kundu, T. K. (*Met. Off., New Delhi*), **Fog over Safdarjung Airfield.** *Indian Journal of Meteorology and Geophysics*, Delhi, 8(3):296–302, July **1957.** 2 figs., 4 tables, 2 refs. **DWB DLC**—An analysis of Dec. Jan. and Feb. data for 1951–1955, for Safdarjung Airfield (New Delhi) shows frequency of occurrence of fog, simultaneous occurrence at Safdarjung and at 13 other alternate fields (Agra, Lucknow, Srinigar, etc.), duration and intensity, time of occurrence and dissipation, relation between fog and humidity or dew point, between fog and surface wind, inversion temperature, synoptic conditions, minimum temperature, etc. Data are presented in analytical tables and graphs. *Subject Headings:* **1. Fog frequencies 2. Fog meteorological parameter relationships 3. Safdarjung Airfield (New Delhi), India.**—*M.R.*

9.9–246 551.575.1

Los Angeles (City). Dept. of Airports. LAX FIDO Technical Sub-Committee, **A port on F.I.D.O., Los Angeles International Airport.** Los Angeles, Calif., March 25, **1954.**)+p. figs., tables, refs. Mimeo. **DWB**—This report constitutes an evaluation of the sults of the LAES (Landing Aids Experiment Station) (Arcata, Calif.) FIDO tests made om 1947 to date, and application of the system to the Los Angeles airport (LAX). The rcata data gave results completely at variance with British results and with evident conditions Los Angeles. The British arrived at a warming of 6°F to dissipate fog, whereas Arcata sults indicated only 3° warming was necessary. British allowed 30% loss of heat by radiation hereas LAES allowed none. Final conclusion is that about 15% is lost by radiation to rrounding fog and 15% to space. *Subject Headings:* **1. Artificial fog dissipation 2. Fog vestigation Dispersal Operation (FIDO) 3. Arcata, Calif. 4. Los Angeles Airport, Calif. Thompson, Jack.**—*M.R.*

CLOUDS

9.9–247 551.576.11

Ludlam, Frank H. (*Imperial College, London*), **Phases in the evolution of cumulonimbus.** *'eather Radar Conference, 6th, Cambridge, Mass., March 26–28, 1957, Proceedings Supplement,* ıb. **1957.** p. 1–7. 2 refs. **DWB** (M01.81 R124pc)—So many processes are involved in the oduction of weather that it is difficult in meteorology to make definite, simple statements hich have a perfectly general validity. In this article, the author gives an outline of a heme of cumulonimbus evolution from which he has omitted important reservations and ıalifications, in the interest of emphasizing certain features which already have fairly general cognition but which seem to deserve more careful study. *Subject Heading:* **1. Cumulonimbus evelopment.**—*Author's abstract.*

9.9–248 551.576.11

Mamina, E. F. and Fedorov, E. K., **O vodnom balanse oblachnoĭ sistemy.** [The water ılance of a cloud system.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 5:658–663, ay **1957.** 2 tables, 5 refs., eq. **DLC**—By analyzing standard meteorological observations, is possible to obtain data for evaluating various characteristics of the water balance of ouds and on the relationship between the water content of clouds and the quantity of pre- pitation falling out from the clouds. By means of specially frequent airplane sounding of ıssing cloud system, and by supplementary observations in the surrounding region, it is ossible to obtain reliable and adequately exact data for estimating the moisture producing pacity of cloud systems. Cloud systems of a warm front produce, during their existence, ı amount of precipitation exceeding the water content of the clouds at a given moment. ence, it follows that the entire mass of liquid water in clouds of this type renews itself several mes during the existence of the cloud system. Data are presented on the mean value of ecipitation layer falling from clouds at various stations in the U.S.S.R. *Subject Headings:* **Water balance of clouds 2. Water content of clouds—precipitation amount relationships U.S.S.R.**—*I.L.D.*

9.9–249 551.576.11:551.588.2

Vul'fson, N. I. (*Geophysical Inst. Acad. Sci. U.S.S.R.*), **Usloviia obrazovaniia kuchevykh lakov v gornoĭ mestnosti.** [Conditions for the formation of cumulus clouds in mountain eas.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 7:821–830, July **1956.** 7 figs., tables, 11 refs. **DLC**—The local conditions influencing the character of atmospheric convec- on, and hence the development of cumulus clouds, were investigated during the summer of 954 and 1955 in the Alazan Valley, in the Kakhetan Range which is situated in the foothills the central Caucasus Mountains. During the summer the number of convection currents, eir size, and the excesses of the temperature within them over the surrounding atmosphere greater on the slopes of the Kakhetan Mountains than in the adjoining valleys and lowlands, ıd the air is more humid on the mountain slopes than at the same levels over the valleys. he convection currents over the mountain ridges attain high elevations above sea level and ually extend above the condensation level, while over the lowlands they rarely attain even e condensation level. This explains the occurrence of cumulus clouds over elevations and eir almost complete absence over lowlands. Numerical data are presented on the character-

istics of the convection currents on a given day and on the temperature and humidity di tribution over the mountain and lowlands. *Subject Headings:* **1. Cumulus cloud formatio 2. Convection over mountains 3. Caucasus Mts.**—*Author's abstract and I.L.D.*

PRECIPITATION

See also: **Dry winds bibliog., U.S.S.R.,** 9.9–3; **Tobacco crop yield and irrigation experiments** (Miles), 9.9–82; **Drought effects on ranching** (Bonnen), 9.9–83; **Extreme values theory, De Bilt, Netherlands** (Levert), 9.9–100; **Interpolation of records** (McDonald), 9.9–101; **Frontal type precip., Central States** (Smith, Wilhelm), 9.9–128; **Prefrontal rainfall, Central Texas** (Cole, Lowry), 9.9–129; **Cloud seeding experiments** (Bigg), 9.9–143; **pH content of precip., Sweden** (Utåker), 9.9–151; **Runoff indexes, Tenn** (Richards), 9.9–274; **Rainfall and sunspot cycles, Madras, India** (Sen Gupta), 9.9–295; **Electrical charges on drops** (Godard), 9.9–313.

9.9–250 523.51:551.577:551.577.3

Bowen, E. G. (*Div. of Radiophysics, C.S.I.R.O., Univ. Grounds, Chippendale, N.S.W.*) **Relation between meteor showers and the rainfall of August, September and Octobe** *Australian Journal of Physics*, Melbourne, 10(3):412–417, Sept. **1957.** 2 figs., table, 10 refs **DLC**—The rainfall of approximately 300 stations over the globe during the 3 months Aug Sept., and Oct. shows departures from the mean which are similar in character to those prev ously reported for the months Nov., Dec. and Jan. Peaks in the rainfall curve occur on th average 31 days after meteor showers, in good agreement with the value of 30 days arrived a for Nov., Dec., and Jan. One of the best known meteor showers of the whole year, name the Perseids, occurs during the period examined. This is a long-enduring stream whic maximizes from Aug. 10 to 14. Commencing 31 days later is the most prominent rainfa peak of the whole year, extending from Sept. 10 to 24. *Subject Headings:* **1. Meteor showers rainfall relationships 2. Meteor showers 3. Maximum rainfall curves.**—*Author's abstract.*

9.9–251 551.577:551.578.1

Imai, I. (*Met. Research Institute*), **Precipitation streaks and raindrop size-distribution** *Papers in Meteorology and Geophysics*, Tokyo, 7(2):107–123, July **1956.** 16 figs. (incl. photos 14 refs., 12 eqs. **DWB**—An analysis is made of a continuous record of raindrop size di tributions, obtained at the ground, and an explanation is given in terms of the theory precipitation streak. The maxima and the minima of the space concentrations for large dro preceded those for smaller drops. The observed time-lags agree well with those compute from upper wind data, except for very small drops. From the observed surface distribution an attempt is made to deduce probable size distributions in the generating cell. Considerin the effects of evaporation and collision during fall, and also an effect resulting from the dro counting technique in which drops are classified by size, the size distributions of raindro in the generating cell are presumed to be very narrow with many small drops and few lar drops, compared with those usually observed at ground level in a continuous rain. The are very similar to those obtained by BLANCHARD (1953) in Hawaiian orographic rain-cloud *Subject Headings:* **1. Raindrop size distribution 2. Precipitation streaks.**—*Author's abstract.*

9.9–252 551.577:551.588.2(92)

*Reesink, J. J. M. and Siahaan, Mopul, **Rainfall on the volcanoes of Java.** *Madjalah Ilmu Alam Untuk Indonesia*, Bandoeng, 112(2):186–190, July/Dec. **1956.** fig. (2 fold 2 tables, 5 refs. **DLC**—Rainfall data for 10 volcanic peaks in Java are analyzed to see wh influence, aspect, direction of air flow during season, or local factors had on the rainfall-heig relationships. It was found that on the average the maximum rainfall occurs at about 100 and not much systematic variation can be determined because of insufficient network and dat Local and seasonal variations do exist, however. Data are presented in analytic tables an graphs for each volcano and slope. *Subject Headings:* **1. Orographic rainfall 2. Rainfa height variations 3. Java.**—*M.R.*

9.9–253 551.577.1:551.577.13:546.

Borrel, Francis, **Sur les analyses de précipitations fractionnées et leur rapport avec théorie de formation de la pluie.** [Analysis of precipitation samples and its implicatio

icerning the theory of rain formation.] *Académie des Sciences, Paris, Comptes Rendus,* (4):480–482, Jan. 21, **1957.** 2 refs. **DLC**—Measurements of sodium in precipitation nples show that sodium concentration during rain decreases exponentially as a function the amount of water fallen. Na concentrations found in the last samples of a rainfall are good agreement with values derived from accepted theories of precipitation formation. *bject Headings:* **1. Rain formation 2. Sodium in precipitation.**—*Trans. of author's abstract.*

9.9–254 551.577.1:551.551

Garrigue, Hubert, **Observations sur le déclenchement de la pluie.** [Observations on the ase of precipitation.] *Académie des Sciences, Paris, Comptes Rendus,* 244(7):925–926, . 11, **1957.** 3 refs. **DLC**—In the presence of suitable wind and fog conditions, rain is med in the turbulent eddies created at the Puy de Dôme summit by a tower under con- ıction, now 50 m high. *Subject Heading:* **1. Rain formation.**—*Trans. of author's abstract.*

9.9–255 551.577.11:551.577.36

Battan, Louis J. (*Dept. of Met. Univ. of Cic.*), **Influence of the environment on the initiation precipitation in tropical cumuli over the ocean.** *Weather Radar Conference, 6th, Cambridge, ss., March 26–28, 1957, Proceedings,* pub. **1957.** p. 51–59. 7 figs., 9 refs. **DWB** (M01.81 24pc)—An analysis has been made of the day-to-day variation of the likelihood of precipita- n in cumulus clouds observed over the ocean in the vicinity of Puerto Rico. It is shown t the probability of rain in a cloud having a particular height depends on environmental ıditions, and that the principal factors governing precipitation initiation are stability, tical wind shear, and depth of the moist layer. On the west side of polar troughs moving o the tropics, these parameters have values which make precipitation likelihood small. *bject Headings:* **1. Precipitation probability 2. Precipitation mechanism 3. Precipitation m tropical cumuli 4. Puerto Rico.**—*Author's abstract.*

9.9–256 551.577.11:551.501.777

Magono, Choji, **Investigation of the size distribution of precipitation elements by the otographic paper method.** *Yokohama, Japan. National University, Science Reports, Sec.* 1, . 3:41–51, March **1954.** 12 figs., 4 refs., 7 eqs. **DLC**—Empirical formulas are derived the relationships between the areas colored by precipitation elements (on photographic per) and the actual size of the precipitation element, in the case of raindrops ($d=10^{-\frac{1}{2}}D^{\frac{3}{2}}$), w flakes ($d=2^{-\frac{1}{2}}D$), very wet snow flakes ($d=1.5^{\frac{1}{2}}h^{\frac{1}{2}}D^{\frac{1}{2}}$) and graupel ($d_\omega=2^{-\frac{1}{2}}D'$), d nifying the diameter of the particle (d_ω=graupel diameter equivalent to spherical water p), D signifying mean diameter of colored area (D' of dark brown area), and h thickness of w flake. *Subject Headings:* **1. Raindrop size distribution measurement 2. Precipitation ticle size measurement.**—*G.T.*

9.9–257 551.577.2(58)

Semenova, O. A., **O nekotorykh anomaliiakh osadkov v Sredneĭ Azii.** [Precipitation malies in Central Asia.] (In: Akademiia Nauk Uzbekskoi SSR. Institut Matematiki i khaniki, **Meteorologiia i gidrologiia v Uzbekistane.** Tashkent, **1955.** p. 41–42, 5 figs., .) **DLC**—On the basis of precipitation data from 1886–1953 for a number of stations in ntral Asia (Tashkent, Fergana, Dzhizak, etc.), the author computed moving ten year means mean precipitation for each year and for the cold (Sept.–March) and warm (April–Aug.) sons in order to determine the periods of positive and negative anomalies. Curves show moving ten year averages of precipitation for the various stations, and map shows areal tribution of years with the least annual precipitation and with the greatest amount of ıual precipitation during the past 20 yrs and isohyets of the most humid year in percent of rmal. It was found that (1) the amount precipitation at any point varies not only consider- y from year to year but also in a ten year mean; (2) periods of positive and negative anom- s extend over considerable areas in Central Asia; (3) during individual extreme years, ge negative or positive anomalies extend over very large areas, sometimes over all of Central a; and (4) during the past 20 yrs in particular, the amount of annual precipitation in ividual parts of Central Asia was 40 to 80% of the normal during dry years and 120–250% es the normal during wet years. *Subject Headings:* **1. Precipitation anomalies 2. Central a.**—*I.L.D.*

9.9–258 551.577.2:551.57

Smith, James L. and Crabb, George A., Jr., **Patterns and classes of rainfall at East Lansi Michigan, and their effect upon surface runoff.** *Michigan. Agricultural Experiment Stati East Lansing, Quarterly Bulletin*, 39(1):47–62, Aug. **1956.** 3 figs., 5 tables, 5 refs. **DLC**— this study of the relationship between patterns and classes of rainfall and the occurrence surface runoff from the watersheds, precipitation totaling 0.25 in. or more was analyz provided it included snow, sleet or hail. The rainfall is grouped into six classes and six p terns, and data are given on the distribution of classes in each month for the period 1941–19 number of rainstorms by classes, distribution of patterns by month for classes 1–6 for 194 1951, class distribution patterns and total rainfall for 382 storms 1941–1951, water losses months and cover types, watershed B 1941–1951, etc. It was found that the total amount storm rainfall is more important than either class or pattern in producing runoff or intens under cultivated conditions. But none of these factors above can be regarded as a prima runoff producing factor. *Subject Headings:* **1. Rainfall distribution 2. Rainfall-runoff re tionships 3. East Lansing, Mich.**—*I.L.D.*

9.9–259 551.577.33(4

Frolow, Vladimir and Péreau, Aimée, **Définition morphologique de la phase de la co posante annuelle des pluies en Italie.** [Dependence on morphology of the phase of the ann component of rainfall in Italy.] *Geofisica Pura e Applicata*, Rome, 37:303–308, **1957.** fi 4 refs. French and English summaries p. 303. **DLC**—Using monthly mean rainfall data 3600 stations in Italy and additional stations in Corsica and Tunisia (over half with 10 or more record), the annual cycle (lines of equal phase) is calculated and shown graphica with respect to relief. Three orographical zones are delineated: (1) the Alps; (2) the Valley and (3) the long Apennine Range. The results are interpreted with respect to hyd logical and also geological interests. LABROUSTE's (1944) method of harmonic analysis w used in the calculations. *Subject Headings:* **1. Annual rainfall cycles 2. Precipitation cy zones 3. Italy. I. Labrouste, H.**—*M.R.*

9.9–260 551.577.34(4

*Karapiperis, L. N., **Trends in Athens rainfall.** *Geofisica Pura e Applicata*, Rome, 38:2 264, **1957.** 5 figs., 4 refs. **DLC**—The trends appearing in the annual and seasonal rain of Athens were investigated by running 30-yr averages. The period used began in 1860 a the data up to Dec. 1956 were used. Figures 1–5 show the 30-yr running average curves each of the four seasons and for the year as a whole. *Subject Headings:* **1. Rainfall tre 2. Long period records 3. Athens, Greece.**—*Author's abstract.*

9.9–261 551.577

Tennessee Valley Authority. Div. of Water Control Planning, **Intense storms, summ of 1956 in Tennessee Valley region.** *Supplement to Precipitation in Tennessee River Ba Annual* 1956. Knoxville, Tennessee, July **1957.** 14 p. 4 plates, tables. **DWB** (M06.1/ T297, Suppl. 1956)—Includes two reports on intense rainstorms which occurred in the Ten see Valley region during June 1956: **Storm of June 21, 1956 near Manchester, Clay County, K** by EDMUND S. DALY (p. 1–7) and **Storm of June 30, 1956 in Cove Creek basin, Hayw County, N. C.,** by WILLIAM H. TWEED. Both papers have been prepared by area engine who report results of their investigation concerning precipitation amounts, peak stre discharges, and damage that occurred in connection with the two storms. The first pa includes isohyetal maps and both papers give average rainfall and peak discharge amou for several locations. *Subject Headings:* **1. Rainstorms 2. Kentucky 3. North Caroli** —*G.T.*

9.9–262 551.577.38(52

Goda, I., **On the summer drought in Setouchi District, Pt. 3.** *Journal of Meteorolog Research*, Tokyo, 9(1):35–38, March **1957.** 6 tables, 4 refs., eqs. In Japanese, Eng summary p. 35. **DWB, DLC**—In this paper the author examined the drought in Setou Japan, from the statistical standpoint of view, and obtained the following results: 1) drought damages in Kagawa Prefecture, Shikoku District, are associated with the sum rainfall amount in Setouchi equal to or less than 300 mm. 2) Relations between the t

ount of rainfall from Jan. to March at Tadotsu (X), the summer rainfall amount in Setouchi , the mean temperature during Jan. and Feb. at Tadotsu (Z), and the rainfall index in May (K_5) are examined. *Subject Headings:* **1. Drought, Setouchi District, Japan Drought damage 3. Setouchi District, Japan.**—*Author's abstract.*

RAIN AND SNOW

See also: **Snow and avalanche manuals** (Handl), 9.9–34; **Water content of snow, Maryland** (McGuire), 9.9–99; **Rainfall forecasting, Japan** (Kawamoto), 9.9–138; **Ice crystal formation** (Bigg, Macklin), 9.9–226; **Ice crystal growth rate** (Lindenmeyer et al.), 9.9–230; **Ice crystal formation on supercooled film** (Schaefer), 9.9–237; **Raindrop size distribution** (Imai), 9.9–251.

9.9–263 551.578.1

Daigo, Y. and Nose, T., **The applicable region of the amount of a rainfall at a weather tion.** *Japan. Meteorological Agency, Tokyo, Memoirs of Industrial Meteorology*, 20(2):25–Jan. **1957.** 3 figs., table. In Japanese; English summary p. 27. *Journal of Agricultural teorology*, Tokyo, 12(4):155–156, March **1957.** 2 figs. In Japanese; English summary p. . **DWB**—From the standpoint of applied meteorology, it is very important to decide the a to which the amount of a rainfall at a weather station is applicable. In this paper the hors try to decide the area and shape of the regions where the amounts of a rainfall during ront or typhoon differ from those observed at several stations in the Kanto District by less n ±10, ±20, or ±30%. Three graphical examples are presented. *Subject Headings:* **Areal rainfall distribution 2. Rainfall amount 3. Kanto District, Japan.**—*Authors' tract.*

9.9–264 551.578.11:535.33

Litvinov, I. V., **Funktsii raspredeleniia chastits zhidkikh osadkov.** [Functions of liquid cipitation particle distribution.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 12: 4–1483, **1956.** 11 refs., 9 figs., 6 eqs. **DLC**—The spectral distribution of drops in liquid cipitation is investigated on the basis of experimental data. It is shown that the distribu- n of MARSHALL-PALMER and BERT does not correspond to the actual distributions in rains varying origin. A distribution function that corresponds better to reality is developed. *bject Heading:* **1. Spectral distribution of raindrops.**—*I.L.D.* [*Partly author's abstract*].

9.9–265 551.578.11:535.242

Mikirov, A. E., **Fotoelektricheskiĭ metod issledovaniia raspredeleniia razmerov chastits dkov.** [Photoelectric method of investigating the size distribution of precipitation par- es.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 1:104–108, **1957.** 7 figs., 2 refs. C. Trans. into English by J. Thompson in the English language edition of the **Izvestiia,** *lletin of the Academy of Sciences of the U.S.S.R., Geophysics Series*, No. 1:104–119, **1957,** ed 1957 by American Geophysical Union. 3 figs., 5 tables, 9 refs. **DWB**—A technique d apparatus are described for measuring from airplanes the concentration of raindrops, ir size distribution, their charges and the total amount of water in a given volume of air. e apparatus is based upon the use of an index of scattering of drops which increases the sitivity and excludes completely the daylight background. Parallel beams of light are lected into a focus of an objective and provide an actual slit which serves as a source of t. This slit is closed by a black screen which has the dimensions of the representation the slit. Between the screen is situated a recording photomultiplier. Graphical data are sented on the spectrum of rain drops and on charges associated with particular raindrop s. *Subject Headings:* **1. Raindrop size distribution 2. Photoelectric observation 3. Elec- al charges on raindrops.**—*I.L.D.*

9.9–266 551.578.11:778.3

Schotland, Richard M. and Kaplin, Edward J. (*both, N. Y. Univ.*), **Photography helps something about the weather.** *Industrial Photography*, N. Y., 6(2):28–29, Feb. **1957.** otos. **DLC**—A two-camera technique for studying the behavior of droplet models falling a gravitational field (ball bearings ranging in diameter from 1.5 to 16 mm falling through a ar solution) is described. A representative series of photographs showing the process of a

larger bearing colliding with a smaller bearing is presented. *Subject Headings:* **1. Raindr behavior 2. Drop motion photography 3. Photography.**—*G.T.*

9.9–267 551.578

Landauer, Joseph K., **On the deformation of excavations in the Greenland névé.** *U. Snow, Ice and Permafrost Research Establishment, Research Report,* No. 30, April **1957.** 14 9 figs., 7 tables, 7 refs., 14 eqs. **DWB** (M78.4 U586re)—Deformations occurring in a tunn two trenches, and a 30 m deep pit excavated in the Greenland névé in the summer of 19 have been measured over a period of 2 yrs. The experimental results indicate that closu rates increase with lateral distance from a restraining boundary up to distances of about 1 At larger distances, the effect of the boundary is not appreciable. Closure rates for de excavations are not found to be strongly depth-dependent. This is due to a roughly paral increase of viscosity and pressure with depth. Vertical compaction results from the pit agr well with those calculated from the depth-density relation using SORGE's Law. A theoreti calculation for the tunnel and pit closure, which is a modification of existing theories for t deformation of an elastic, compressible, thick-walled cylinder, is in fair agreement with t observed deformations. From this agreement it appears that the flow behavior of the né can be described on the basis of a Newtonian viscosity. The trench closure is described as t squeezing out of horizontal layers, fixed at some distance from the trench, and modified o slightly by the drag of neighboring layers. Measurements will be continued during future su mers. *Subject Headings:* **1. Deformation of granular snow 2. Greenland.**—*Author's abstr*

9.9–268 551.578.41:551.57

Vasiliskov, I. A.; Gotlib, IA. L., Razzorenov, F. F. and Smolin, N. I., **O metodicheski ukazaniiakh po izucheniiu zazhoenykh iavleniĭ.** [Methodological instructions for the stu of phenomena involving the accumulation of water under snow.] *Meteorologiia i Gidrolog* Leningrad, No. 2:55–57, Feb. **1956. DWB, DLC**—A critical evaluation of the instructi for the study of water accumulated under snow issued by the hydrometeorological serv and computed by V. R. BERDLENIKOV. Various inadequacies are pointed out. These incl failure to define properly the concept of formation of water accumulation under snow, complete explanation of the physical processes of its formation, etc. *Subject Heading:* **1. Wa accumulation under snow.**—*I.L.D.*

9.9–269 551.578.45(7

§Mook, Conrad P. (*U. S. W. B., Wash. Natl. Airport*), **The "Knickerbocker" snowsto of January 1922 at Washington, D. C.** *Weatherwise,* Boston, 9(6):188–191, Dec. **1956.** 4 fi table, 3 refs. **DWB**—Synoptic charts (surface) are presented for 0800 h on 27, 28 and Jan. 1922, bracketing the period when Washington, D. C., received its heaviest snowfall record—28.0 in. The roof of the Knickerbocker Theatre collapsed at 9 p.m. on Jan. 28 wit death toll of >100 people. Streets and railroads were blocked with snow, though winds w light and drifting negligible. Baltimore had 23″ and Lynchburg, Va. 20″. The next great snowfall was Feb. 12–13, 1899, when 19.0″ were measured. The storms which produced 9 heavy snows since 1899 had a great deal in common—blocking high to N. and N.E. an low moving N.E. just off coast from Hatteras to E. of New England. *Subject Headin* **1. Record snowfalls 2. Snow disasters 3. "Knickerbocker" snowstorm, Wash., D. (Jan. 28, 1922) 4. Washington, D. C.**—*M.R.*

HYDROMETEOROLOGY

See also: **Collected works, Uzbekistan, U.S.S.R.,** 9.9–4; **Leningrad. Hydromet. Inst., U.S.S.R.** (Morozov), 9.9–55; **Soviet hydrology bibliogs.,** 9.9–62; **Hydrologic nomograms** (Weiss), 9.9–105; **Hydrologic statistics, Dneper River, U.S.S.R.** (Kheinson), 9.9–110; **River stage forecasting** (Ray, Mondschein), 9.9–139; **Soil moisture reserves** (Shpak), 9.9–219; **Hydrologic balance, Tunisia** (Preziosi), 9.9–221; **Rainfall distribution, Mich.** (Smith, Crabb), 9.9–258; **Accumulation of water under snow** (Vasiliskov), 9.9–268.

9.9–270 551.579:551.

†*Eardley, A. J.; Gvosdetsky, Vasyl and Marsell, R. E., **Hydrology of Lake Bonneville sediments and soils of its basin.** *Geological Society of America, N. Y., Bulletin,* 68(9):11

201, Sept. 1957. 20 figs., 16 tables, 37 refs. **DLC**—This "monographic" article discusses e volume, salt content, salinity variations, annual accession of salt, precipitation-evaporation onomy, lake level adjustment to precipitation, of temperature changes related to precipita- on, the expansions of Lake Bonneville, shore-lines, sedimentary records, soils and their rrelation and, finally, the chronology of various stages of Lake Bonneville. The classical id a proposed chronology are compared graphically. About 6 billion tons of salt now exist the Basin, and there is an annual accretion of 1 million tons, yielding a date of 6000 yrs r the last overflow. The latter, however is estimated at >30,000 yrs ago (from C^{14} analysis). Wind action is supposed to be the cause of the deficiency in salt at present. A rise of 20–30 would cause Salt Lake to overflow. Actual range of lake level has been nearly 19 ft in storical times, due to precipitation variations. *Subject Headings:* **1. Hydrology of Lake onneville 2. Salt content of lakes 3. Lake level variations 4. Lake Bonneville, Utah.** —*M.R.*

9.9–271 551.579(432.1)

†Kalähne, Hermann, **Über die Hydrogeologie der Querfurt-Freyburg-Naumburger uschelkalkmulde.** [Hydrogeology of the Querfurt-Freyburg-Naumburg shell limestone pression.] *Deutsches Gewässerkundliches Jahrbuch, Besondere Mitteilungen*, No. 18, pub. erlin, Akademie-Verlag, **1957.** 41 p. 13 figs., tables, 195 refs. **DWB**—Hydrogeological round and surface waters) water balance (precipitation, evaporation, runoff, etc.) and other drological aspects of the region are discussed and illustrated with tables, charts, maps, etc. ohyetal charts for the year, the winter half year, and the summer half year are appended r the area around Freyburg (East Germany). *Subject Headings:* **1. Hydrologic surveys Isohyetal charts 3. Freyburg region, East Germany.**—*M.R.*

9.9–272 551.579:551.482

Mozhaĭkin, E. N., **O sovremennoĭ roli nachal'nika gidrologicheskoĭ stantsii v izuchenii zhima rek.** [Contemporary role of the directors of hydrological stations in the study of river gimes.] *Meteorologiia i Gidrologiia*, No. 9:43–44, Sept. **1956. DWB, DLC**—The author ints out that at present the directors of river stations are not sufficiently informed about the der aspects of their work, namely, the physical geography of the regions where their stations e located, the hydrology of the river where their stations are located, the hydrology of vers of the basins as a whole. The author suggests the following program to prepare precise counts of the characteristics of rivers, to collect at the stations materials on the geomor- ology, hydrology, etc. relating to the range of activity of the stations; to conduct field udies on regional geography of the station, etc. *Subject Headings:* **1. River hydrology Hydrologic station personnel improvement.**—*I.L.D.*

9.9–273 551.579:551.491:550.4:539.16

Raymond, J. R. and Bierschenk, W. H., **Hydrologic investigations at Hanford.** *American eophysical Union, Transactions*, 38(5):724–729, Oct. **1957.** 5 figs. **DWB, DLC**—During e twelve-year history of the Hanford Plant, several hundred wells were drilled throughout e area in order to obtain hydrologic, geologic, and radiologic monitoring data. Hydrologic ta obtained throughout the Hanford site show that, due to discharge to ground of about billion gallons of nonradioactive process cooling water, the water table has locally been ised approximately 80 ft and that 20 mi southeast of the disposal sites it has been raised 5 ft. Pumping-test data indicate that locally the underlying aquifers may transmit as little 30,000 gpd/ft and as much as 3,000,000 gpd/ft. Such hydrologic and hydraulic data are ed to assist evaluation of safe radioactive waste disposal practices and to estimate effects large volume nonradioactive process cooling water disposal. *Subject Headings:* **1. Hydrologic ta 2. Radioactive waste disposal 3. Water table increase 4. Hanford, Wash.**—*Authors' stract.*

9.9–274 551.579.1:551.577

*Richards, Marshall M., **Runoff indices in the rainfall-runoff relation.** Aug. **1957.** Thesis M.Sc.)—Tennessee Univ. 79 p. 26 figs., 8 tables, 10 refs. **DWB** (M79.6 R487ru)—Soil- oisture deficiency, initial baseflow, well-level, and antecedent-precipitation index were each

used as a variable in a graphical correlation of rainfall and runoff of the type used by the U. S. Weather Bureau. The data used were for Chestuee Creek above Englewood, Tenn., for the period Jan. through March of the years 1949 to 1953. These data were furnished by the Hydraulic Data Branch of the Tennessee Valley Authority. A comparison of the relative merits of each of the four runoff indices which were tested revealed that correlation with antecedent-precipitation index or initial baseflow were equally good and were better than that for either well-level or soil-moisture deficiency. *Subject Headings:* **1. Rainfall-runoff relationships 2. Runoff indexes 3. Chestuee Creek, Tenn.**—*Author's abstract.*

9.9–275 551.579:627.5

U. S. Waterways Experiment Station, Vicksburg, Miss., **The Mississippi basin model.** *Corps of Engineers, U. S. Army,* Oct. **1952.** 11 p. 6 figs. **DWB** (627 U586m)—A scale model of the entire Mississippi River basin was constructed by the Corps of Engineers on an 800-acre site near Jackson, Miss., and is described and illustrated in this paper (photographs, diagrams). On this intricate model, levee studies, flood routing analyses and research on a variety of problems connected with floods can be conducted under simulated flood conditions. *Subject Headings:* **1. Mississippi River basin models 2. Flood control 3. Flood routing.**—*G.T.*

9.9–276 551.57

U. S. Weather Bureau. Cooperative Studies Section, **Hydrologic outline: runoff from seasonal snow pack, Upper Colorado Basin.** 5 p. Ozalid reproduction of typescript. **1957. DWB**—Outline of procedures for determination of: 1) maximum snow cover, 2) maximum snow melt rates, and 3) application to basin in question (development of hydrographs and routing curves). *Subject Headings:* **1. Hydrologic studies 2. Snow melt 3. Runoff 4. Upper Colorado Basin.**—*M.R.*

CLIMATOLOGY AND BIOCLIMATOLOGY

CLIMATOLOGY

See also: **Loren Blodgett and history of climatology** (McGuire), 9.9–58; **Climatology abstracts, Poland,** 9.9–63; **Building construction** (Zawadil), 9.9–90; **Arctic engineering climatology, Alaska** (Potter), 9.9–93.

9.9–277 551.5

Bilham, E. G., **Climatology.** *UNESCO, Arid Zone Research,* 9:26–43, **1957.** 5 figs. **DWB, DLC**—The author discusses the general aims of climatology, the applications of climatology on land utilization, in industry, in energy production, etc., the organization of a network of observing stations, including types of observing stations, first order observations, full synoptic and auxiliary synoptic stations, normal climatological stations and rainfall stations; the spacing of stations; equipment; choice of sites; measurement of temperature, humidity and rainfall; sunshine recorders; measurement of wind direction and speed and barometric pressure; units of measurement; climatological hours of observations; handbooks, returns and summaries; publications of data; headquarters, organization, personnel and international relations. *Subject Headings:* **1. Climatology 2. Applied climatology 3. Climatic stations**—*I.L.D.*

9.9–278 551.5

Okołowicz, Wincenty, **Zadania klimatologii polskiej i organizacja badán klimatologicznych w Polsce.** [Tasks of Polish climatology and the organization of climatologic research in Poland.] *Przegląd Geograficzny,* Warsaw, 27(1):5–17, **1955.** Russian and English summaries, p. 13–16. **DLC**—The author defines the object and tasks of climatology; discusses the best methods of investigating the origin and structure of the climate of the country as a whole and in its local aspects (microclimate); introduces a classification of problems to be solved by modern Polish climatology, and advances a new plan of distribution of tasks among institutions and agencies concerned with the carrying out of climatological studies in Poland, which should

placed under the supervision of the State Hydrological and Meteorological Institute of pland. *Subject Headings:* **1. Climatological research 2. Poland.**—*A.M.P.*

9.9–279 551.58:519.24:551.501.45

Pédelaborde, Pierre, **Remarques sur l'emploi de deux notions classiques en climatologie: s moyennes, les corrélations.** [Remarks on the use of two classic concepts in climatology: eans and correlations.] *Revue Géographique des Pyrénées et du Sud-Ouest*, Paris, 28:79–86, arch **1957.** fig., table, 18 refs. **DLC**—The use of mean values (especially in making mparisons in time or space) and of correlation studies is explained with particular attention the limitations of these methods. Indiscriminate application of means as climatological iteria would yield unrealistic results, and statistical correlations should not be accepted as bstitutes for physical laws. *Subject Heading:* **1. Statistical methods in climatology.**—*G.T.*

CLIMATE OF PARTICULAR PLACES

See also: **Antarctic climat.** (van Rooy), 9.9–1; **Climatic charts, N. Greenland** (Hamilton, Rollitt), 9.9–39; **Monthly data bulletins, Sierra Leone and Gambia,** 9.9–114.

9.9–280 551.582.1(267)

Genty, Robert, **Sur la climatologie de Kerguelen.** [Climatology of Kerguelen.] *Acamie des Sciences, Paris, Comptes Rendus*, 244(1):106–107, Jan. 2, **1957. DLC**—The climate Kerguelen Island is determined by its maritime location (hence the moderate temperature ariations ranging from −6 to +15°C), and the proximity (1800 km) of the Antarctic conent (hence the average temperature of Kerguelen is relatively low for its latitude). In ddition to these general characteristics, the author discusses a peculiarity of the climate of erguelen, an accumulation of clouds over the island due to an orographic effect. The echanism of this cloud accumulation is explained. *Subject Headings:* **1. Climate of Kerguelen land 2. Kerguelen Island.**—*G.T.*

CLIMATIC CHANGES

See also: **Tree ring growth, American Arctic** (Giddings), 9.9–40; **Sea surface temp. variations, N. Pacific** (Rodewald), 9.9–201.

9.9–281 551.583

Korn, Hermann, **Morphologische und tektonische Initialursachen grosser Klimaschwanungen: Konzept für eine neue Klimatheorie.** [Morphological and tectonic original causes great climatic variations: concept for a new climatic theory.] *Geologische Rundschau*, tuttgart, 45(2):337–341, **1956.** French summary p. 465. **DLC** (GE1.G4917)—The various ypes of theory regarding the causes of climatic changes (i.e., the ice ages) are critically reviewed nd all except that of orogeny found to be wanting in explanation of various aspects of known anges. The purely meteorological, purely astronomical, volcanic dust and solar variation eories are insufficient. On the other hand, mountain building sets up a differentiation that increased when water is removed from the oceans and stored in glaciers on the high mountains in the polar regions—because of increased continentality and reduced oceanic influences. lso, ocean currents are restricted. The paper was completed in 1939 by the author who died Africa (1946) to where he had been expatriated. *Subject Headings:* **1. Climatic change eories 2. Tectonic theory of climatic change.**—*M.R.*

9.9–282 551.583.2:551.311.12

An der Lan, Hannes (*Innsbruck*), **Zur Witterung des Sommers 1956 im tiroler Hochebirge.** [Weather in the summer of 1956 in the Tirolean high mountains.] *Wetter und eben*, Vienna, 9(1/2):14–17, **1957.** fig., 4 refs. **DLC**—Observations on snow and ice condiöns on the Zirmsee and its vicinity (Ötztal Alps) made on Aug. 22, 1956 are reported and mpared with observations made on Sept. 9, 1953. Evidence is cited for change in the imatic conditions in the High Alps during this period. In Aug. 1956 the lake was almost tirely frozen over, and never thawed during the summer of 1956. The change in meteorogical conditions suggested by TOLLNER (*Wetter und Leben*, 8(5/7) **1956**; *see* 9.3–265, March

1958, *MAB*) is confirmed. *Subject Headings:* **1. Climatic variations 2. Snow and ice observations 3. Frozen lakes 4. Glacial climates 5. Ötztal Alps, Austria.**—*I.L.D.*

MICROCLIMATOLOGY

See also: **Shelter belts, Japan** (Ota, Motoki), 9.9–87; **Building construction** (Zawadil), 9.9–90.

9.9–283 551.584.4

Mukhina, E. G., **Ob izmerenii temperatury rasteniĭ termoelektricheskim plastinchatym priemnikom.** [Measurement of plant temperature by means of a thermoelectric plate receiver.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, 37(64):32–40, **1954.** fig., 1 tables. **DLC**—The various advantages in measuring the temperature within a plant thermo electrically by using temperature receivers, either in the form of plates or needles, are discussed The author describes a thermoelectric device for measuring temperature of plants. Data are presented on the temperature of a leaf measured with a needle or plate-like receiver in the presence of radiation, temperature of a plant measured with a plate receiver in the presence of artificial radiation, temperature of fruits and stalks, of soils, etc. *Subject Heading:* **1. Plant temperature measurement.**—*I.L.D.*

9.9–284 551.584.43:633.7

Zinina, A. F. and Fel'dman, Ia. I., **Mikroklimaticheskie usloviia raĭonov kul'tury chai na Kubani v letnee vremia.** [Microclimatic conditions of tea plantation regions along the Kuban during the summer season.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geog.*, No. 5:40–43 Sept./Oct. **1955.** fig. **DLC**—The author considers the general climatic conditions in the Kuban which are unfavorable to the cultivation of tea, such as small amount of rainfall, low probability of rainy days, and high probability of clear days as compared with Anaseuli (W Georgia), and examines the microclimatic observations on temperature and relative humidity under a forest canopy carried out during a summer with protracted drought in the Kuba (Goriachii Kluich, N. Georgia). The temperatures and relative humidity under a forest canopy are compared with those in the open field and it was found that the latter had a higher relative humidity as well as higher temperature. The tea crop in the open field was superior to that under the forest canopy. The microclimatic conditions associated with different slope exposures and the relationship of particular exposures to the growth of tea in the Northern Caucasus are analyzed. *Subject Headings:* **1. Tea microclimatology 2. Tea cultivation 3. Kuban, U.S.S.R.**—*I.L.D.*

9.9–285 551.584.6

Kitaeva, N. N., **Opyt gigienicheskoĭ kharakteristiki mikroklimata i vozdushnoĭ sredy teatra.** [Experiment on the hygienic characteristics of the microclimate and air in a theater.] *Gigiena i Sanitariia*, Moscow, 22(1):68–69, Jan. **1957. DLC**—The hygienic properties of the microclimate and of the air of the auditorium and stage of the Bolshoi Theater of the U.S.S.R. in Moscow (the State Order of Lenin's Academic Great Theater of the U.S.S.R.) was investigated from the point of view of the auditors and of the performers and others associated with the history, construction, air capacity, etc. of the theatre. Air temperature measurements and organic matter content of the air were made over a period of three years, and incidence of illness and time lost through illness among the workers associated with the theatre investigated In most instances the air temperature was above the comfort zone. The vertical distribution of temperature, the temperature during the course of the performance, etc. was investigated *Subject Headings:* **1. Theater microclimates 2. Moscow, U.S.S.R.**—*I.L.D.*

CLIMATIC CLASSIFICATION

9.9–286 551.585:63(81

†Mota, Fernando Silveira da (*Chief, Climat. Sec., Inst. of Agronomy, Pelotas*), **Divisão agroclimática do Brasil meridional.** [Agroclimatological divisions of Southern Brazil.] *Pelotas, Brasil. Instituto Agronômico do Sul, Boletim Técnico*, No. 7, June **1953.** 18 p table, map (fold.), 31 refs.—Southern Brazil, including the states of Paraná, Santa Catarina and Rio Grande do Sul, is divided according to the agroclimatological classification develope

y A. L. Da Fina. This scheme is based upon the concept of "agroclimatic district" character-ed by a uniform climate, crop cultivation and crop yield and is defined by Da Fina's thermo-luviometric values. These are as follows: (1) highest and (2) lowest mean monthly tem-erature, average precipitation of the three (3) warmest and (4) three coldest months and 5) percent of precipitation in the remainder of the year and of the snowfall during the warmest nd coldest three months. The application of this method is illustrated by specific examples. table giving the stations and the climatic data, and a map showing the climatic districts are iven. *Subject Headings:* **1. Agro-climatic regions 2. Climatic classification 3. Climate of Brazil 4. Brazil.**—*I.L.D.*

9.9–287 551.585(81)

*Mota, Fernando Silveira da (*Chief, Climat. Sec., Inst. Agronômico do Sul, Pelotas*), **Estudo o clima do estado do R. G. do Sul, segundo o sistema de W. Koeppen.** [Study of the climate f the state of Rio Grande do Sul according to the Köppen system.] *Revista Agronômica*, Porto Alegre, Brasil, 16(193/198):132–141, Jan./June **1953.** 5 tables, 3 refs.—Data from 39 tations in Rio Grande do Sul are tabulated and used to calculate the Köppen classes for the egion. The monthly and annual mean temperature, average monthly seasonal and annual recipitation, number of cloudy days, station location data and period of record are given. Each climatic type is described in the text as it applies to the state of Rio Grande do Sul. *Subject Headings:* **1. Climate of Rio Grande do Sul 2. Köppen's classification 3. Rio Grande lo Sul, Brazil.**—*M.R.*

BIOCLIMATOLOGY

See also: **Pine tree distribution** (Hocker), 9.9–86; **Arctic engineering climatology** (Potter), 9.9–93; **Bioclimatology of fermentation** (Giordano), 9.9–95; **Heat effects on rabbits** (Marsh), 9.9–98.

9.9–288 551.586:612

*Meigs, Peveril and de Percin, Fernand (*Quartermaster Res. and Develop. Center, Natick, Mass.*), **Frequency of cold-wet climatic conditions in the United States.** *Monthly Weather Review*, Wash., D. C., 85(2):45–52, Feb. **1957.** 15 figs., 2 tables, 3 refs. **DWB, DLC**—Cold, wet conditions (for outdoor workers) are defined in terms of combinations of simultaneous occurrences of temperature, precipitation, cloud, wind and snow on the ground; ranging from 23°F to 67°F (23°F–59°F if no wind $\leqslant$5 mph and 23°–49°F if no precipitation or fog occurs). Machine tabulations of data from 61 stations show that these specifications are met most often in the Pacific Northwest (Tatoosh Island, Wash., at the entrance to the Straits of Juan de Fuca 71% of the year; 82% in Dec. and Jan. and 32% even in July) and least often in the Southwest and Florida (Yuma 2%, Miami 1%). Secondary maxima occur in the Great Lakes, New England and Middle Atlantic States in winter (>70%), and secondary minima in North Dakota in Jan. (<10%). *Subject Headings:* **1. Cold-wet climatic data 2. Climate and man 3. United States.**—*M.R.*

ENVIRONMENTAL INFLUENCES

See: **Sea salt nuclei** (Ohtaki), 9.9–233; **Orographic rainfall, Java** (Reesink), 9.9–252.

SYNOPTIC CLIMATOLOGY

9.9–289 551.589.5:551.571:551.524

Ozorai, Zoltán, **Nedvesség-elemek a légtömegelemzésben.** [Humidity factors in air-mass analysis, Pt. 2]. *Időjárás*, Budapest, 55(9/10):264–273, Sept./Oct. **1951.** tables, 30 eqs. Russian and English summaries p. 310. **DLC**—In the first part of this article (*see* 5.3–306, March 1954, *MAB*), some humidity elements were investigated as to their conservative properties (i.e., their suitability for air mass analysis). In this second part, some combined temperature-humidity elements (thermohygrometric data) are investigated. A table is presented, showing conservative properties (conservative, quasi-conservative, not conservative) of the 17 elements investigated (in both articles), in respect to dry or wet adiabatic change, nonadiabatic change, and in the presence of evaporation. *Subject Headings:* **1. Air mass analysis 2. Thermohygrometric data.**—*G.T.*

MISCELLANEOUS

COSMIC INFLUENCES

9.9–290 551.590.21

Berkes, Zoltán, **A napfoltok és az időjárás.** [Sunspots and weather.] *Természet és Társadalom*, Budapest, 115(7):405–408, July **1956.** charts, graphs. **DLC**—Relations between such phenomena as solar radiation, sunspot activity, geomagnetic storms, auroras, outbreaks of polar air, pressure variations and other weather factors are discussed and shown in examples (sunspot cycle and wind speed at Budapest; solar flares and precipitation at Prague, etc.). It is believed that solar activity cannot be predicted as yet with an accuracy sufficient for use in weather forecasting. *Subject Heading:* **1. Sunspot effects on weather.**—*G.T.*

9.9–291 551.590.21:551.509:523.746

Cehak, K., **Die Sonnenfleckenperiode und das Wiener Wetter.** [Sunspot period and Vienna weather.] *Wetter und Leben*, Vienna, 8(12):240–243, **1956.** table. **DWB**—An examination of the question whether the weather of 1957, a year with a sunspot maximum, can be forecast in advance from previously known relationships between sunspots and weather. The average variation of the individual weather elements within a sunspot cycle for Vienna, Austria, is examined. The deviations of the individual weather elements from the normals are considered and presented in a table giving their deviations for each year within a sunspot cycle. On the basis of these data various weather characteristics for 1957 are predicted. *Subject Headings:* **1. Sunspots and weather 2. Sunspot cycle 3. Weather forecasting 4. Vienna, Austria.**—*I.L.D.*

9.9–292 551.590.21:523.746

Norton, H. W. (*College of Agric., Univ. of Ill., Urbana, Ill.*), **Sunspots and weather.** *Monthly Weather Review*, Wash., D. C., 85(4):117–118, April **1957.** table, ref. **DWB, DLC**—The fact, demonstrated here (by showing month to month correlations of monthly mean temp. data for Greenwich, Eng., 1764–1863) that there is little relation between the Dec. temperature and that of the Jan. following, indicates that little effect of any sunspot cycle of 10–100 yrs could ever be found in terrestrial weather. The analysis shows that at the 1% level no cycle could account for as much as 5% of the variance of Jan. mean temp. at Greenwich during the 99 yrs (1765–1863). *Subject Headings:* **1. Sunspot-temperature relationships 2. Month-to-month temperature correlation 3. Sunspot cycles 4. Greenwich, Eng.**—*M.R.*

9.9–293 551.590.21:523.746:525.6

Pellisari, L., **Le macchie solari influiscono sul clima?** [Do sunspots influence climate?] *Rivista di Meteorologia Aeronautica*, Rome, 17(3):54, July/Sept. **1957. DLC**—The information for this note was taken from *Science et Vie* (No. 1, Jan. **1957**). It is a summary of J. Bollinger's lecture delivered at an American Meteorological Society meeting. Bollinger bases his research on a tidal theory of sunspots. According to this theory, sunspot maxima occur every 11 yrs and 27 days when Mercury, Venus, Mars and Saturn are in line with the sun producing maximum tidal stress. Bollinger also finds evidence of a coincidence of sunspot maxima with the highest Nile floods between 722 B.C. and 103 A.D. *Subject Headings:* **1. Sunspot-tide relationships 2. Sunspots 3. Sunspot-flood relationships.**—*G.T.*

9.9–294 551.590.21:523.746

Roberts, Walter Orr, **Does solar activity affect the weather?** American Petroleum Institute, 36th Annual Meeting, Chic., Nov. 1956, Proceedings, Section 6/7:76–81, **1956.** 5 figs. **DLC**—Solar-weather relationships have been suspected since 1801 when Sir William Herschel first speculated on the effect of solar emissions on the earth's atmosphere. Most evidence obtained since then has been contradictory, but recent measurements in special wave lengths and of the complex features of solar activity give hope of finding more reliable clues to the interaction of the sun on the atmosphere and weather. Examples of known relationships are cited and illustrated. *Subject Headings:* **1. Solar-weather relationships 2. Sunspot cycles**—*M.R.*

9.9–295 551.590.21:551.577.33(548):523.746

Sen Gupta, Prabhat K., **Sunspot cycle in regional rainfall.** *Weather*, 12(10):322–324, Oct. 1957. 2 figs., 4 refs. **DWB**—Rainfall pattern in N.E. monsoon (Oct.–Dec.) in S.E. Madras shows a tendency for excess rainfall to occur during sunspot minima and less rain at spot maxima. *Subject Headings:* **1. Rainfall cycles 2. Sunspot cycles 3. Madras, India.** —*C.E.P.B.*

9.9–296 551.590.21:551.509

Roberts, Walter Orr (*High Altitude Obs., Boulder, Colo.*), **Solar-terrestrial relationships: Weather and communications.** *Smithsonian Contributions to Astrophysics*, Wash., D. C., (1):99–101, 1956. **DLC**—Several aspects of solar influence are discussed and, in particular, the measured and the probable influences upon world-wide weather patterns and ionospheric radio communication. It is suggested that the future practical stakes in short- and long-range weather forecasting may well surpass the expected gains within radio communication forecasting. *Subject Headings:* **1. Solar weather relationship 2. Solar radio communication relationship 3. Extended weather forecasting 4. Radio-weather forecasting.**—*W.N.*

9.9–297 551.590.21

*Shapiro, Ralph and Ward, Frederick, Jr., **The solar corona and Kansas City temperatures.** *American Meteorological Society, Bulletin*, 38(7):434–435, Sept. 1957. table. **DWB**—FARTHING (1955) attempted (*see* 8A–45, Jan. 1957, *MAB*) to show a strong relation between the daily mean temperature anomaly at Kansas City and the passage of a center of enhanced green emission (more than scale 20) across the central meridian of the solar corona. In this note the results obtained by FARTHING are compared with similar data for 1951 obtained from Sacramento Peak observations (47 cases), and at Climax, Colo. (23 cases) and with all cases (70). FARTHING's results do not agree with the results of either or of both stations, nor do the 3 stations agree too well with each other. Conclusion is that the present results look like what might be expected from a random selection of key days. *Subject Headings:* **1. Solar weather relationships 2. Solar effects on temperature 3. Kansas City, Mo. I. Farthing, S. D.**—*M.R.*

VISIBILITY

9.9–298 551.591.3:551.509.325(521.27)

Yamada, N., **Visibility at the Tokyo International Airport, Pt. 4.** *Journal of Meteorological Research*, Tokyo, 9(3):176–183, March 1957. 2 figs., 11 tables. In Japanese; English summary p. 176. **DWB, DLC**—The diurnal variation of types of visibility on days with no precipitation and fog at the Tokyo International Airport are classified into 4 types, as follows: A) good visibility throughout day, B) poor visibility in the evening only, C) poor visibility in the morning only, D) poor visibility in the morning and evening. Fifteen kinds of synoptic patterns corresponding to the above 4 types of visibility variations are selected. The relations between the types of visibility variation and the kinds of synoptic pattern are tabulated and illustrated. These tables and figures will be useful aids in forecasting the visibility at the airport. As the formation of fog causes the poorest visibility by which the airport is often closed, the objective forecast diagram for radiation fog and the table in which the frontal fog at the airport is classified into 5 types, are presented. (For Pts. 1 and 3, *see* 9.8–266 and 267, Aug. 1958, *MAB*.) *Subject Headings:* **1. Visibility data 2. Visibility forecasting 3. Fog forecasting 4. Tokyo, Japan.**—*Author's abstract.*

OPTICAL PHENOMENA

See also: **Temp. gradient, Greenland Ice Cap** (Hamilton), 9.9–194; **Photoelectric nuclei counters** (Pollak, Metnieks), 9.9–234.

9.9–299 551.593.1:535.314

International Union of Geodesy and Geophysics, Brussels, Aug. 1951, **Comptes rendus des Travaux de la Section [II] des Nivellements de Précision.** [Proceedings of Section 2, Precision leveling.] Ed. by Jean Vignal and T. J. Kukkamäki, pub. Paris, by the Association of Geodesy, 1955. Issued as a supplement to its *Bulletin Géodesique*, No. 22, Dec. 1951,

p. 474–485. **DWB**—Report contains a number of resolutions and papers regarding accuracy of leveling, including studies of atmospheric refraction, presented at the Brussels Assembly in Aug. 1951. Members are listed. Papers on crust tilling, variations in sea level, etc. are also included. (*See* KUKKAMÄKI, T. J. and SIMONSEN, OVE for abstracts of separate articles.) *Subject Headings:* **1. Atmospheric refraction errors in leveling. I. Vignal, Jean II. Kukkamäki, T. J.**—*M.R.*

9.9–300 551.593.13

Link, F. (*Central Astron. Inst., Ondrejov*), **Asymétries solaires IV.** [Solar asymmetries.] *Bulletin of the Astronomical Institutes of Czechoslovakia*, Prague, 3(1):15–16, Jan. 31, **1952**. fig., 5 refs. **DLC**—Author discusses the possible meteorological origin of the asymmetry of solar phenomena on the west and east half of the solar disc but does not come to a definite conclusion. *Subject Headings:* **1. Solar activity 2. Solar-terrestrial relationships.**—*A.A.*

9.9–301 535.42 551.593.5

Keller, Joseph B.; Lewis, Robert M. and Seckler, Bernard D., **Diffraction by an aperture, Pt. 2.** N. Y. Univ. Institute of Mathematical Sciences. Div. of Electromagnetic Research. Contract AF 19(122)-42, Research Report, No. EM-96, **1956.** 36 p. 5 figs., 11 refs., 85 eqs. **DWB**—The field diffracted by an aperture of any shape is evaluated asymptotically for small wavelengths on the basis of several approximate diffraction theories. These are the Kirchhoff method, the two customary modifications of it, and W. BRAUNBEK's new modification of this method. In each case a double integral over the aperture is evaluated asymptotically, and contributions from interior stationary points, edge stationary points, and corners of the edge are obtained. The contributions from points of each type, according to all the theories examined, are exactly of the form recently deduced by J. B. KELLER using his geometrical theory of diffraction. The edge stationary points and the corners correspond respectively to rays singly diffracted from edges and from corners. For edge diffracted rays the Braunbek diffraction coefficients alone coincide with those given by the geometrical theory of diffraction but the Braunbek method does not apply to corner diffraction. None of these methods takes account of multiple diffraction as does the geometrical theory of diffraction. *Subject Headings* **1. Diffraction theory.**—*Authors' abstract.*

9.9–302 551.593.53:551.521.1

Sekihara, K. (*Met. Res. Inst., Tokyo*), **On the role of the scattered light higher than the second (Studies of the distribution of ultraviolet sky radiation, Pt. 7).** *Papers in Meteorology and Geophysics*, Tokyo, 6(2):150–163, Sept. **1955.** 4 figs., 6 tables, 23 refs., 13 eqs. **DWB**—Intensities of light from the sky ranging from about λ 4660Å to λ 3115Å were calculated, using CHANDRASEKHAR's theory of radiative equilibrium in a Rayleigh atmosphere, and the results were compared with observed distribution and also with theoretical results of direct integration of primary and secondary scattering. With the exception of the distribution when the sun's altitude is high where non-Rayleigh scattering is remarkable, the observed distributions were almost quantitatively explained by the theory of radiative equilibrium, but the theory of direct integration was not, because the scattered light of higher orders than the second, amounting to 30~40% in the range of the wave-length of about λ 3115Å, gave an essential feature to the distribution. However, in the visible range these quantities were at most several percent and the validity of the method of direct integration was confirmed to some extent. *Subject Headings:* **1. Sky light 2. Ultraviolet sky radiation 3. Ultraviolet radiation distribution.**—*Author's abstract.*

ELECTRICAL PHENOMENA

See also: **Thunderstorm elec. textbooks, Czechoslovakia** (Rihánek, Postranecký), 9.9–7; **Potential grad. meas. and radiosonde obs.** (Koenigsfeld), 9.9–127; **Ionic diffusion in clouds** (Gunn), 9.9–229; **Electrical charges on aerosols** (Luchak), 9.9–240.

9.9–303 551.594.1/2:551.50

Gonsior, B. (*Physikalisches Inst. Heidelberg Univ.*), **Messungen der Luftelektrischen Raumladung mit Schwebstoff-Filtern.** [Measurement of the electric space charge in the

mosphere with filters.] (In: Israël, H. (*ed.*), **Luftelektrizität im A.G.I.: Bericht über die igung in Aachen am 11.–12. Mai 1956.** pub. Aachen, **1957.** p. 17–23. fig., foot-refs., tables. German and English summaries p. 17.) **DWB?**—A simple method of measuring e electric space-charge in the atmosphere is described. The well known daily fluctuations the space-charge are used to test the possibilities of this method. The results are compared th theory and with other publications. It is shown that the space-charge can be measured tisfactorily in this way. *Subject Heading:* **1. Atmospheric electricity measurement.**—*uthor's abstract.*

9.9–304 551.594.11

Chalmers, J. Alan; Kirkman, J. R. and Maund, J. E., **Research on point discharge in the mosphere both from natural and artificial points.** Durham, England. Univ., Contract F 61(514)-743-C, Technical Report, [Unnumbered] Oct. 1, 1954–Sept. 30, **1956.** 24 p. figs., 18 refs., 18 eqs.—A mast was erected to support a point at 27 m and 34 m, and the oint-discharge current from this was measured. The current, I, was found to be related to e potential gradient, F, at the ground at 47 m to windward, and the wind-speed W by: $=K(W+C)\ (F-M)$, where K, C and M are constants. Earlier observations of the relation tween point-discharge current and potential gradient were re-analyzed and showed that in a rmula $I=B(F-M)^n$, the best value of n is 1.08, so that a linear law is much closer than a uare law, as previously stated. The comparison of measurements of potential gradient points upwind and downwind of the mast should show effects depending on the ions released the point-discharge process. This has been studied theoretically and observationally, the sults to date show that the difference between the potential gradients is less, by a factor of out 2, than that predicted for a linear stream of ions; the divergence may be due to ionic ffusion, but it would appear that published constants are not able to account for the results. me measurements have been made of the point-discharge current through a growing tree d suggest that it is 1½ to 2 times that through a single metal point of the same height. *Sub-t Headings:* **1. Point discharges 2. Potential gradient.**—*Authors' abstract.*

9.9–305 551.594.11:551.508.94

Clark, John F. (*U. S. Naval Res. Lab., Wash., D. C.*), **Airborne measurement of atmos-eric potential gradient.** *Journal of Geophysical Research*, Wash., D. C., 62(4):617–628, ec. **1957.** 8 figs., 15 refs., 25 eqs. **DLC**—Grounded-rotor induction-type electric field eters are mounted horizontally at the wing tips and vertically at the bottom of the fuselage a P4Y airplane for the airborne measurement of the fair weather atmospheric potential adient. The measurement has been corrected for the electric field distortion, due to the rcraft itself, by comparing observed values of potential gradient and conductivity at the rth's surface and at altitude during low-altitude flights over a portable ground station. A pical altitude distribution of potential gradient observed during clear weather at 67°N lat. integrated to obtain a value of atmospheric potential at a 6-km altitude of 220 kv relative the earth's surface. *Subject Headings:* **1. Atmospheric potential gradient measurement Electric field meters.**—*Author's abstract.*

9.9–306 551.594.12:551.574.1

Gunn, Ross (*U. S. W. B., Wash., D. C.*), **Electrification of aerosols by ionic diffusion.** *merican Journal of Physics*, N. Y., 25(8):542–546, Nov. **1957.** 3 figs., 2 tables, 7 refs., 7 eqs. **WB**—The distribution of free electrical charges transferred to cloud droplets by ionic diffusion ovides an illuminating example of a simple statistical process. Tables are constructed from st principles, shown to agree with successive terms of the binomial point equation of statistics, d applied to the initial stages of droplet electrification. The final equilibrium distribution, scribed by the basic electrification equation for aerosols, corresponds to an equipartition tween the electrostatic energy of the droplets and their thermal kinetic energy. *Subject eadings:* **1. Electrification of aerosols 2. Ion diffusion.**—*Author's abstract.*

9.9–307 551.594.21

Müller-Hillebrand, Dietrich (*Inst. f. Hogspanningsforskning, Uppsala*), **Om uppkomsten elektriska fält i åskmoln.** [On the origin of electrical fields in thunder clouds.] *I.V.A.*

(*Ingeniörvetenskapsakademien och dess Laboratorier*), Stockholm, 28(6):263–267, **1957.** A
stracted from photostat. **DWB**—The working hypothesis discussed here was the author
inaugural lecture as a professor at the Uppsala University, Institute of High-tension Researc
The electrical build-up is explained as taking place in macro-space as a micro-process in thr
steps: (1) A 5 min incubation period during which the field increases by the factor 7; the io
stemming from cosmic radiation travel to small water drops uniting into light negative
charged precipitation. (2) A 10 min period to attain ripeness; the field increases by the fact
20: the negative ions travel to larger drops or snow grains, the positive ions to the slow
descending smaller drops or crystals. (3) A 5 min discharge period when the field increas
by the factor 200: rime frost forms on graupel, and ice crystals rub against graupel. *Subj*
Heading: **1. Thundercloud electrification.**—*W.N.*

9.9–308 546.214:551.594.22:551.510.4

Vassy, A. T. (*Physique de L'Atmosphére, Univ. de Paris*), **The formation of ozone**
electrical discharges in the atmosphere: experimental results and the general aspects. (I
The threshold of space, ed. by M. Zelikoff. N. Y., Pergamon Press, **1957.** p. 73–77. 8 ref
DLC—Continuous measurements of the concentration of atmospheric ozone near the grou
and of the electrical discharges in thunderstorms have been made at the Station Scientifiq
du Val-Joyeux (lat. 48°49′N., long. 2°1′E.). A study of the results reveals that two perio
are clearly distinguishable. During summer months the correlation between the sharp ris
in the quantity of ozone and the appearance of thunderstorm is very marked. But in wint
on the other hand, the ozone amount near the ground does not depend on the occurrence
thunderstorms but may increase when the atmospheric conditions are relatively stable.
appears that the formation of ozone by the thunderstorms is rather due to the electrical di
charges present in the atmosphere before and during the formation of thunder clouds tha
because of the lightning. A study of this problem in the laboratory has revealed that t
lightning produces more nitrogen oxides than ozone. *Subject Heading:* **1. Ozone-thunderstor**
relationships.—*Author's abstract.*

9.9–309 551.594.221:551.510.

Hill, Edward L. (*School of Physics, Univ. of Minnesota, Minn.*), **Very low-frequen**
radiation from lightning strokes. *Institute of Radio Engineers, N. Y., Proceedings,* 45(6):77
777, June **1957.** 3 figs., 7 foot-refs., 3 eqs. **DLC**—A theory of the generation of low-frequen
electromagnetic radiation by cloud-ground lightning strokes is presented. Only the effe
of the return stroke is considered. The predicted form of the radiated pulse from the retu
stroke is a single cycle with a field variation which varies linearly with time. The spectr
distribution of the radiated energy is found to be centered at about 11 kc, with a total width
half-maximum of 12 kc. The total energy radiated in one leader and return stroke is estimat
at 220,000 joules. Some qualitative considerations on the emission of radiation at extreme
low frequencies are given. *Subject Headings:* **1. Lightning strokes 2. VLF propagation.**
Author's abstract.

9.9–310 551.594.2

Malan, D. J. (*Bernard Price Inst. of Geophysics, Univ. at Johannesburg*), **The relati**
between the number of strokes, stroke intervals and the total durations of lightning discharge
Geofisica Pura e Applicata, Milan, 34:224–230, **1956.** 2 figs., 3 tables, 8 refs. **DLC**—T
author discussed the apparent difference between the number of lightning strokes observ
photographically and electrically, the interval between strokes and time of de-ionization of t
lightning channel, the relation between the number of strokes and the total durations of flash
and flashes of very long duration, and the occurrence of long intervals between strokes. *Su*
ject Headings: **1. Lightning strokes 2. Lightning stroke intervals 3. Lightning flash duratio**
—*I.L.D.*

9.9–311 551.594.

Chalmers, J. Alan, **Problems concerning precipitation electricity.** (In: Israël, H. (*ed*
Luftelektrizität im A.G.I.: Bericht über die Tagung in Aachen am 11.12. Mai 1956. pu
Aachen, **1957.** p. 24–27. 4 refs. English and German summaries p. 24.) **DWB?**—Pr

tation electricity is important in two problems of atmospheric electricity, namely, the ntenance of the earth's negative charge and the production of electricity in clouds. Meas- nents should be undertaken with a receiver completely exposed to the atmosphere, with ection for potential gradient changes. *Subject Headings:* **1. Electricity of precipitation tmospheric electricity.**—*Author's abstract.*

9.9–312 551.594.21/25:551.574.1

Gunn, Ross (*U. S. W. B., Wash., D. C.*), **Electrification of precipitation and thunder- ms.** *Institute of Radio Engineers, Proceedings,* 45(10):1331–1357, Oct. **1957.** 18 figs., efs., 44 eqs. **DLC**—The fundamental physical processes responsible for the observed trification of ordinary precipitating clouds, as well as thunderstorms, is considered in ntitative terms and new facts are emphasized. Cosmic rays and radioactivity, sometimes plemented by corona and photoionization, produce ion pairs in the atmosphere. These are transferred to cloud droplets or ice crystals by diffusion or by electric fields and thereby blish a droplet charge distribution. This distribution is profoundly influenced by the erved differences between the positive and negative light ion conductivities in the atmos- re. Electrification by induction frequently supplements these processes. Rain formed he association of these cloud elements may be highly electrified and a mixture of positive negative drops is usually produced. Experimentally well-established processes are sidered that can selectively charge such rain or selectively discharge it. It is shown that er process can establish a free space charge distribution that is transferred toward the und by gravity, and may be large enough to develop electric fields exceeding the dielectric ngth of air. Lightning then intervenes. The conditions necessary to establish gross free rge distributions by regeneration are specified and shown to be met under frequently rring meteorological situations. Many of the observed characteristics of thunderstorms traceable to the nonuniform semiconducting nature of the lower atmosphere and its non- ic behavior. The analysis reflects the results of earlier work. *Subject Headings:* **1. Elec- cation of clouds 2. Thunderstorm electricity 3. Electrical charges on raindrops 4. Ion duction theory.**—*Author's abstract.*

9.9–313 551.594.253:551.577.13

Godard, L., **Sur l'utilisation des fluides de silicone pour la mesure des charges électriques viduelles portées par de fines gouttelettes.** [On the utilization of silicone fluids for suring individual electric charges in droplets.] *Puy de Dôme. Observatoire, Bulletin,* . No. 3:84–93, July/Sept. **1957.** 4 figs., 6 refs., 7 eqs. **DWB**—This contribution shows some trical phenomena at the surface of separation between water droplets and a silicone fluid. e use proceedings of microscopic photography, we determine the sizes of droplets and their ectories under the influence of an electrical field, in a condenser recipient. The experi- tal results show that the initially uncharged or weakly charged droplets take apparent ges proportional to their radii; these charges correspond to an electro-kinetic potential ch depends from the chemical constitution of the droplet. We can think that the charges ained by this proceeding come from the constitution of ionic atmosphere which is formed orientation of dipoles of each interface silicone-droplet. *Subject Headings:* **1. Electrical rges on drops 2. Precipitation composition.**—*Author's abstract.*

9.9–314 551.594.253

Levin, L. M., **K voprosu o sluchaĭnoĭ elektrizatsii oblachnykh i dozhdevykh kapel'.** [Ran- electrification of cloud and rain droplets.] *Akademiia Nauk SSSR, Izvestiia, Ser. fiz.* No. 11:1358–1360, **1956.** 5 figs., 7 refs., 5 eqs. **DLC**—A critical examination of Ross NN's studies on the electrification of cloud droplets with $Z<20\mu$ (*J. of Colloid Sci.*, **1955,** 07, *see* 6F–353, June 1955, *MAB*) and the electrification of cloud and rain droplets with 20μ arriving during orthokinetic coagulation of large drops with small charged droplets *of Met.*, 12(6):511, **1955,** *see* 7.3–291, March 1956, *MAB*). The author maintains that $Z>20\mu$ the results are incorrect for the following reasons, viz: the calculation by GUNN S for experimental data supporting his theoretical calculation gives

$$S/(Z_1+Z_2)\approx 10^{-8}-10^{-6}.$$

Accordingly for drops of this size the effect of electrical forces upon capture and velocit coagulation is insignificant. While the parameters of stationary distribution found by G are sensitive in relation to the effect of electric charges ($S \rightarrow 0$) the stationary distribu found by GUNN attains infinite depression, etc. In so far as the electrification of dro with $Z < 20\mu$ is concerned the author believes that GUNN oversimplified the problem. *Su Heading:* **1. Electrical charges on drops.**—*I.L.D.*

AURORAS.

See also: **Auroral theories and bibliogs.** (Chamberlain), 9.9–17; **IGY auroral program** (Nicolet), 9.9–47.

9.9–315 551.594.52 551.521

Harrison, A. W. and Jones, A. Vallance (*both, Univ. of Saskatchewan*), **Measurem of the absolute intensity of the aurora and night airglow in the 0.9–2.0μ region.** *Journ Atmospheric and Terrestrial Physics*, London, 11(3/4):192–199, **1957.** 6 figs., 2 tables refs., 2 eqs. **DLC**—Absolute intensity measurements have been made at Saskatoon of bands of $\Delta\nu = 2$ and $\Delta\nu = 3$ sequences of the OH vibration-rotation bands of the night airg The relative intensities are in reasonable agreement with the calculations of HEAPS and H BERG (1952). The rate of production of OH molecules excited to the ninth vibrational l was estimated from the intensity of the 4,2 band to be 15×10^{11} molecules/cm^2 column Spectra of the aurora in the 0.9μ–2.0μ region have been obtained with a spectrometer emplo a PbS cell detector. The spectra show several new bands of the Meinel N_2+system a strong emission at 1.04μ to which both the 0,0 1PG N_2 band and the $^2p - ^2D$ NI dou probably contribute. Absolute intensity measurements of the infra-red auroral bands a reasonable agreement with estimates based on extrapolations from bands at shorter w lengths. *Subject Headings:* **1. Auroral intensity measurements 2. Night airglow inte measurements.**—*Authors' abstract.*

9.9–316 551.594.52:551

Kim, J. S. and Currie, B. W., **Horizontal movements of aurora.** *Canadian Journ Physics*, Ottawa, 36(2):160–170, Feb. **1958.** 2 figs., 4 tables, 18 refs. **DWB, DLC**—Meas ments on the drifts of auroral forms at three stations to the south of the auroral zone in W Central Canada failed to show evidence of a motion due to the earth's rotation relativ fixed excitation patterns in space. The distribution and the magnitude of the speed of au structures parallel and normal to the geomagnetic meridians are substantially the sam for non-luminous ionic irregularities observed by radio methods. The speed of an au arc or band parallel to the geomagnetic meridian is apparently constant. Speeds incr with geomagnetic activity, particularly in an east-west direction. There is no definite in tion of a reversal of the east-west motions close to local midnight. Speeds and direct show no characteristic variations with the time of night. *Subject Headings:* **1. Auroral 2. Auroral-geomagnetic relationships 3. West Central Canada.**—*Authors' abstract.*

PART II. ANNOTATED BIBLIOGRAPHY ON COSMIC RAYS IN THE ATMOSPHERE (1956-1958)

By: *Robert Panara*

INTRODUCTION

Among its many research studies in the field of science, the current IGY program has evinced a cular interest in the cause and effect of cosmic rays. Not only the physico-chemical aspects of rays are being carefully studied in terms of eV energy, radio noise intensity and magnetic ns, but also the more important meteorological and biological findings related to these cosmic They are of particular interest in view of the recent successful launchings of artificial satellites he planned attempt at manned space travel in the not-too-distant future. With live animals even human beings as a cargo in such flights, not the least of those prospective hazards involves ic radiation, ionization, and their subsequent effect upon protoplasm and the human body cell. This bibliography is by no means exhaustive, but attempts to give a representative cross-section the varied literature that has appeared since the last bibliography dealing with the subject smic rays was published in the April 1956 (7D–) issue of *MAB*. In the subject outline which ws, the numbers (in parentheses) from 7.5– to 9.7– refer to items on cosmic rays which have ared in *MAB* since the last bibliography was published.

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9I–1 551.521.64

Åström, Ernst, **Energy spectrum of cosmic radiation.** *Nature*, London, 181(4605):330–331, . 1, **1958.** ref. 4 eqs. **DWB, DLC**—The spectrum of cosmic radiation has the property of a er law

$$f = \text{constant } p^{-n},$$

re p is momentum in which n has a constant value of about 2.5 for several powers of tens of p. his paper the author points out that a power law can be obtained if it is assumed that particles ected at low energies are pumped up to higher energies by a pump, the speed of which is a power ction of this momentum." No considerable loss of particles should occur during the acceleration when the particles have reached the maximum energy which can be stored in the accelerator, leave the accelerator. "Hence all particles move up through the energy spectrum in a more ss systematic way, and the time they spend in a certain energy-range is inversely proportional he speed of the pump." A mechanism is considered in which the betatron effect is compared a scattering or diffusion of the particles. Here a power spectrum with $n = 1$ is obtained. In the hborhood of the sun under the influence of magnetic fields, the value of n may be changed for netrical reasons. *Subject Heading:* **1. Cosmic ray spectrum.**—*I.L.D.*

9I–2 551.521.64

Alpers V. V.; Gurevich, I. I.; Kutukova, V. M, et al., **Izuchenie vzryvnykh livneĭ, obrazovannykh nicheskimi chastitsami bol'shoĭ energii.** [An investigation of explosive showers formed by nic particles of high energy.] *Akademiia Nauk SSSR, Doklady*, 112(1):33–35, Jan./Feb. **1957.** ks., eqs. **DWB, DLC**—The results of a preliminary study of 29 explosive showers of cosmic par- s of high energy analyzed by means of the emulsion chamber which consisted of 100 layers a diameter of 10 cm and a thickness of 450μ each. It is shown that all the showers are luced by nucleons and α-particles, are characterized by distinct asymmetry relative to angle $\pi/2$ and contradicts the model of the origin of showers from nucleonic collisions. The distribu- of asymmetry in the observatories was analyzed statistically with the aid of Pearson's bability coefficient applied to each shower and indicates that the observed asymmetry is a istical phenomenon. *Subject Headings:* **1. Cosmic ray showers 2. Cosmic ray asymmetry. Iishakova, A. P. II. Nikol'skiĭ, B. A. III. Surkova, L. V.**—*I.L.D.*

9I–3 523.7:551.521.64

Babcock, Horace W. and Babcock, Harold D., **The sun's magnetic field and corpuscular emis-** . *Nature*, London, 175(4450):296, Feb. 12, **1955.** 8 refs. **DWB**—Observations with a new ument, the solar magnetograph, provide evidence for the structure of the sun's general magnetic and bipolar and unipolar regions. Relations to solar phenomena are discussed. A tentative el for corpuscular ejection is described. *Subject Headings:* **1. Solar magnetism 2. Corpuscular ation.**—*C.E.P.B.*

9I–4 551.521.64:551.590.21

Bartels, Gunter (*Kühlungsborn, Germany*), **A kozmikus sugárzás szolâris napi jârâsának fâzis- ozâsai.** [Phase shifts in the solar diurnal variation of cosmic radiation.] *Időjárás*, Budapest, 5):144–149; May/June **1956.** fig., table, 17 refs. Russian and English summaries p. 144. man version p. VI–X. **DLC**—During the sunspot minimum of the year 1954, an advancement 2.h local time of the occurrence of the phase maximum in the solar diurnal variation of cosmic ation has been observed. During the years 1953–1955, particularly on days with slight geo- netic activity, an even greater degree of phase shift appeared. An explanation of this phe- enon is suggested, extending from the ideas of Alfvén and using the hypothesis that the solar hal variations are governed by two components. *Subject Headings:* **1. Cosmic ray variations olar relations.**—*Author's abstract.*

9I–5 551.521.

Barton, J. C. and Stockhausen, J. H. (*both, Univ. College of the West Indies, Jamaica*), **Tim variations of the cosmic ray intensity in Jamaica.** *Philosophical Magazine*, London, Ser. 8, 3(25):5 62, Jan. **1958.** 4 figs., 17 refs. **DWB**—A three-fold counter telescope has been used to study t radiation penetrating 10 cm of lead at a latitude of 18°N. A barometric coefficient of -0.14 ± 0.02 per millibar was deduced from the semi-diurnal variation. The average counting rate decreased days of high geomagnetic activity and at the same time there was a large increase in the diurn variation. *Subject Headings:* **1. Cosmic ray intensities 2. Jamaica, B.W.I.**—*Authors' abstract.*

9I–6 551.521.

Beiser, Arthur (*New York Univ., N. Y.*), **Cosmic-ray trapping in interplanetary space.** *Journ of Geophysical Research*, Wash., D. C., 63(1):1–17, March **1958.** 8 figs., 13 refs., 24 eqs. **DLC** The existence of long-term variations in cosmic-ray intensity negatively correlated with sunsp activity, a discovery due to FORBUSH, has been explained by DAVIS in terms of a cavity in the galact magnetic field centered about the sun. In the present paper, it is shown that a "diamagnetic" inte planetary region, rather than a "superconducting" one, can account for the cut-off in the prima cosmic-ray rigidity spectrum, as well as for the 11-year variations. The suggested diamagne region is an oblate spheroid in shape, with semiaxes of roughly 5×10^{15} cm and 5×10^{14} cm, and effective permeability of 10^{-4} gauss. The 11-year variations and the rigidity cut-off are analyz in detail on the basis of this model. *Subject Headings:* **1. Cosmic ray intensities 2. Cosmic r variations 3. Diamagnetic interplanetary space.**—*Author's abstract.*

9I–7 551.510.41:551.521.

Benioff, Paul A. (*Tracerlab, Inc., Western Div., Richmond, Calif.*), **Cosmic-ray production ra and mean removal time of beryllium-7 from the atmosphere.** *Physical Review*, N. Y., 194(4):112 1130, Nov. 15, **1956.** 9 figs., 43 foot refs., 14 eqs. **DLC**—The Be^7 production rate in the atmosphe as a function of latitude and altitude, and the latitude flux of nucleons, the mixing and washo processes, and finally the production rate of 5.0 atoms/cm² min in the stratosphere and 1.3 atoms/c min for the troposphere (<35,000 ft) are treated. Curves of mean removal time for tropopau elevation of 30,500, of 35,000 and of 40,000 ft are presented along with several other useful nom grams. Annual removal rate is calculated from the known quantity of Be^7 in rainwater. T amount in the troposphere may last only a few weeks whereas in the stratosphere it might be 10 yea *Subject Headings:* **1. Beryllium-7 in the atmosphere 2. Cosmic ray production rate.**—*M.R.*

9I–8 551.508.25:551.521.

Bothe, W. (*Dir. Max Planck Inst. of Physics, Heidelberg*), **Coincidence method.** *Scien* Wash., D. C., 122(3175):861–962, Nov. 4, **1955.** port. **DLC**—History of the author's work developing the coincidence method of counting cosmic rays and other applications of the coincide method, in collaboration with HANS GEIGER, since 1913, is reviewed. *Subject Headings:* **1. Co cidence method 2. Cosmic ray counters. I. Geiger, Hans.**—*M.R.*

9I–9 539.1:551.521.

Braunbek, W., **Die Durchdringungsfähigkeit energiereicher Strahlen.** [The penetration high-energy rays.] *Umschau*, Frankfurt, a.M., 56(7):205–207, April 1, **1956.** 4 figs., tab **DLC**—The "energy" of different moving particles is defined and the relation of their energy (e to velocity is shown. What happens when such particles penetrate material is described and th depth of penetration of lead plotted. *Subject Headings:* **1. Cosmic ray properties 2. Penetrati radiation.**—*C.E.P.B.*

9I–10 551.521.

†Brown, Robert R. (*Univ. of New Mexico, Albuquerque*), **Time variations of cosmic-ray intensi** *Journal of Geophysical Research*, Wash., D. C., 61(4):639–646, Dec. **1956.** 2 figs., 3 tables, 23 re **DLC**—The time variations of cosmic-ray intensity associated with a large solar flare and a per of strong solar activity are reported. A possible interpretation of these semi-regular time variati in terms of matter emanating from the sun is considered. *Subject Headings:* **1. Cosmic ray tensities 2. Solar activity 3. Cosmic ray variations.**—*Author's abstract.*

9I–11 551.521.64:537.59:550

Brunberg, E.-Å. (*Royal Inst. of Technology, Stockholm*), **Cosmic rays in the terrestrial magne dipole field.** *Tellus*, Stockholm, 8(2):215–233, May **1956.** 32 figs., table, 6 refs., eqs. **DLC** The results of scale model experiments with electron orbits in a magnetic dipole field are given in form of diagrams on big globes. By using these globes it is possible to find the asymptotic directi of cosmic ray particle orbits as a function of momentum and direction of incidence at a cosmic recording station. Globes, representing 16 stations, are depicted. *Subject Headings:* **1. Cosmic research 2. Electron orbits 3. Magnetic field effects.**—*Author's abstract.*

9I–12 551.521.64

Brunberg, E.-Å. and Eckhartt, D. (*both, Royal Inst. of Technology, Stockholm*), **Some remarks the sudden cosmic ray increase on Feb. 23, 1956.** *Tellus*, Stockholm, 8(4):508–512, Nov. 1956. gs., 10 refs. **DLC**—The north and south pointing GM-telescopes at Stockholm measured different mic ray increases during the solar flare on Feb. 23. It is shown that this difference is due to ticles of momenta greater than 10 GeV/c which could not have travelled along straight line paths m the sun. *Subject Heading:* **1. Cosmic ray variations.**—*Authors' abstract.*

9I–13 551.521.64

Carmichael, Hugh (*Chalk River Labs., Atomic Energy of Canada Ltd., Ontario*), **Energy spectrum the soft component near sea level.** *Physical Review*, N. Y., 107(5):1401–1409, Sept. 1, 1957. igs., 2 tables, 11 refs., 7 eqs. **DLC**—An analysis of the transition curves of CARMICHAEL and ELJES has been carried out to yield the transition curves in lead of ion-chamber bursts produced cascades initiated by the electrons and photons of the soft component incident from the at- sphere. From the rates at the maxima of these transition curves, the absolute omnidirectional egral energy spectrum of the electrons and photons of the soft component at sea level, in the rgy range from about 100 Mev to 100 Bev, is deduced. In the energy range below 400 Mev, integral spectrum is in agreement with previous absolute measurements; below 2 Bev it is in nformity with a previous relative measurement; from 1.6 Bev to 100 Bev, where there are no vious determinations, it obeys a power law of exponent -2.00 and the rate for 1.6 Bev is 2.4×10^{-5} sphere of unit area per sec. *Subject Headings:* **1. Soft cosmic rays 2. Cosmic ray spectrum.**— *om Author's abstract.*

9I–14 551.521.64

Chapman, N. G. and Ryder, N. V. (*both, Victoria Univ. College, Wellington, New Zealand*), **me variations of cosmic rays at Wellington, New Zealand.** *Journal of Atmospheric and Terrestrial ysics*, London, 11(3/4):291–292, 1957. 2 refs. **DLC**—Preliminary results obtained from analysis data for Aug. 1955–Aug. 1956, incl. at Wellington, N. Z., geographic latitude 41°S are discussed efly. Minimum energy was about 1015 eV. Equipment, consisting of three unshielded counter ys at corners of an equilateral triangle of 40 m side and a fourth tray at the center and two inclined scopes, is described, observation and analytical methods mentioned and the fact that east showers ow a diurnal variation with a first harmonic of $12.5\pm5.4\%$ amplitude at 1520, and west showers amplitude of $9.1\pm5.4\%$ with maximum at 2040, and extreme values of $28.8\pm19.8\%$ at 15 and st of $19.9\pm18.3\%$ at 215 l.s.t. Conclusion is that diurnal variation of low energy (primary) mic radiation is $<1\%$. *Subject Headings:* **1. Cosmic ray time variations 2. Wellington, New aland.**—*M.R.*

9I–15 551.521.64:537.591.8

Conversi, M. and Rothwell, P., **Angular distributions in cosmic ray stars at 3,500 meters.** *Nuovo Cimento*, Bologna, 12(2):191–210, Aug. 1, 1954. 7 figs., 4 tables, refs. In English; Italian nmary p. 210. **DWB**—A new apparatus was developed consisting of an ionization chamber rounded by 36 G.M. counters connected to a 22 channel-hodoscope. Registration was made by ele-typewriter. Results are represented in statistical distribution functions of zenith angles, ich are expressed analytically. Expected theoretical relations are discussed and the energies of the r forming nucleous are derived. *Subject Headings:* **1. Cosmic radiation 2. Cervinia, Italy.**—*A.A.*

9I–16 551.521.64

†Cranshaw, T. E. and Galbraith, W., **Time variations of extensive air showers and the origin cosmic rays.** *Philosophical Magazine*, 7 ser., 45(370):1109–1118, Nov. 1954. 4 figs., table, 22 s. **DWB**—Sixteen Geiger counters in a square lattice were used to count showers of energies ^{6}–10^{17} ev. Results are analyzed in solar and sidereal time. There is a remarkable degree of ropy and the power law holds in this energy region. Bearing of the results on origin of cosmic s is discussed. *Subject Heading:* **1. Cosmic ray variations.**—*C.E.P.B.*

9I–17 551.521.64

Curtis, Harold, **Effects of the primary cosmic radiation on matter.** *U. S. Air Force. Cambridge search Center, Air Force Surveys in Geophysics*, No. 78, Jan. 1956. 21 p. 10 figs., table, 16 refs. VB, DLC—A survey of the present knowledge of the primary cosmic radiation is presented. The a on the flux of particles as functions of energy, latitude, altitude and chemical type have been roduced in a consistent set of units. The effects of the exposure of materials to this radiation in ms of the produced ionization are predicted. *Subject Heading:* **1. Cosmic ray effects on matter.**— *thor's abstract.*

9I–18 551.521.64:621.396.81

Dauvillier, Alexandre, **Puissant flux solaire nocturne de rayons cosmiques pénétrants.** [Pow ful flux of penetrating cosmic rays from the sun at night.] *Académie des Sciences, Paris, Com Rendus*, 242(11):1399–1401, March 12, **1956.** 2 refs. Also: Bureau, Robert and Bertrand, Maur **Perturbation exceptionnelle du rayonnement solaire le 23 février 1956 vers 0345 T.U.** [Unus disturbance of solar radiation on Feb. 23, 1956 around 0345 G.m.t.] *Ibid.*, 242(16):2025–20 April 16, **1956.** fig. **DLC**—A solar cosmic ray flux of unusual intensity was measured by DAUV LIER at Bagnères on Feb. 23, 1956, starting at 03 h 43 min. The phenomenon was observed three instruments (including a radio telescope) sensible to various cosmic ray components. T recording of high-energy positive nuclei in the dark hemisphere is offered as definite proof o geomagnetic effect. It also appears that a midget star like the sun is capable of emitting parti having far higher energy than assumed previously. BUREAU and BERTRAND report decreases in ra propagation at various locations in France (especially on 11,000 m wavelength) which coinci almost perfectly with the cosmic ray flux observed by DAUVILLIER. He also mentions ionosph and radio-propagation anomalies observed at various stations throughout the world. *Sub Headings:* **1. Cosmic ray flux 2. Radio disturbances. I. Bureau, Robert II. Bertrand, Maur** —*G.T.*

9I–19 551.521.64:546

Dawson, W. K. (*Suffield Experimental Station, Ralston, Alberta*) and Livesey, D. L. (*Our School, Northants., England*), **Photodisintegration of oxygen nuclei into four alpha-particles.** *Ca dian Journal of Physics*, Ottawa, 34(3):241–249, March **1956.** 4 figs., table, 18 refs. **DWB, DL** A total of 323 four-prong stars found in photographic plates, exposed to bremsstrahlung of maxim energy 70 Mev, have been identified as due to the disintegration of O^{16} nuclei into four alpha-partic The excitation function of the reaction exhibits pronounced peaks at 22.5 Mev and 32.5 Mev as w as maxima at intermediate energies, and the integrated cross sections for various energy ranges h been estimated. The mechanism of the process has been investigated and most of the disintegrati proceed via known excited levels in C^{12} and various states of Be^8. *Subject Headings:* **1. Cosmic showers 2. Oxygen disintegration.**—*Authors' abstract.*

9I–20 551.521.64:51

Dedebant, G. and Machado, E. A. M. (*Servico Meteorológico Nacional*), **Empleo de la func generatriz para la integración de procesos bidimensionales.** [Use of the generative function for integration of two dimensional processes.] *Meteoros*, Buenos Aires, 4(3):194–214, July/Sept. 19 7 figs., 2 tables, ref., numerous eqs. Spanish and English summaries p. 194. **DWB**—The gen method of M. S. BARTLETT for determining the function of the distribution of discontinuous proce by means of the generative function is presented and it is applied to bidimensional processes photons and electrons in accordance with the scheme proposed by BLACKETT. The relations between the method of generative function and group theory is stressed. *Subject Headings:* **1. Cos ray research 2. Methods of computation.**—*Based on authors' abstract.*

9I–21 551.52

Dobrovol'skiĭ, S. P.; Nikol'skiĭ, S. I.; Tukish, E. I. and Iakovlev, V. I., **Prostranstven raspredelenie chastits v shirokikh atmosfernykh livniakh, vyzyvaemykh pervichnym kosmiches izlucheniem razlichnoĭ energii.** [Spatial distribution of the particles of extensive atmosph showers produced by primary cosmic rays of various energy.] *Zhurnal Eksperimental'noĭ i Te ticheskoĭ Fiziki*, Moscow, 31(6, i.e., 12):939–942, Dec. **1956.** 3 figs., table, 7 refs. **DLC, DW** Spatial distribution of charged particles at 3860 m was found to be independent of primary part energy in range from 10^{13} to 10^{15} eV. Methods are described and results illustrated graphically in tables and text. *Subject Headings:* **1. Cosmic ray showers 2. Energy effects on spatial tribution of cosmic ray particles.**—*M.R.*

9I–22 551.521.64:537

Dyer, A. J. (*Melbourne Univ.*), **Integral and differential range spectra of sea-level mes** *Australian Journal of Physics*, Melbourne, 7(1):49–46, March 1954. 7 figs., 18 refs., 2 ta **DWB**—The differential and integral range spectra of the hard component of cosmic rays in w and lead have been determined up to a thickness of 1500 $g.cm^{-2}$ of water, and 2800 $g.cm^{-2}$ of l The differential results indicate that there is no anomaly with an intensity greater than 5% in differential momentum spectrum in the region below 4 Be V/c. A comparison of the integral r and momentum spectra supports the energy loss data of HALPERN and HALL in preference to t of BETHE and BLOCK in the case of water. No such distinction of the theories is possible in the of lead and, although the integral absorption curve in lead agrees with that obtained by HEYL and DUNCANSON (1953b), there is an unexplained discrepancy between experiment and the The intensity of knock-on showers as a function of thickness of water absorber has also beer termined. *Subject Heading:* **1. Cosmic ray penetration.**—*Author's abstract.*

9I–23 551.521.64:621.396.8:523.8

Ellis, G. R. (*Physics Dept., the Univ., St. Lucia, Brisbane, Queensland, Australia*), **Cosmic radio-e intensities below 10 Mc/s.** *Journal of Geophysical Research*, Wash., D. C., 62(2):229–234, e 1957. 5 figs., 6 refs. **DLC**—The results of observations of cosmic noise at frequencies of 10.05, , 4.4, and 3.8 Mc/s at Hobart, Tasmania are reported. At the three highest frequencies, half-e dipole aerials were used, while at 3.8 Mc/s the aerial system was an array with a beam-width 0° by 26°. In addition, previous observations at 2.13, 1.43, and 0.9 Mc/s have been reassessed. vas found that the increase in the intensity of the radiation with decreasing frequency ceases bout 10 Mc/s, and that the spectrum is flat between 10 Mc/s and 2 Mc/s, and possibly to 0.9 s. The flux density of the radiation at these frequencies is approximately 2×10^{-19} watt/m^2 $)^{-1}$, the equivalent temperatures varying from 6×10^5 degrees at 10 Mc/s to 3×10^7 degrees).9 Mc/s. *Subject Headings:* **1. Cosmic radio frequency radiation 2. Cosmic radio noise in-ities 3. Hobart, Tasmania.**—*Author's abstract.*

9I–24 551.521.64

Farrow, Leonilda Altman (*Lab. for Nuclear Science, M.I.T.*), **Mean free path of high-energy eons in the atmosphere.** *Physical Review*, N. Y., 107 (6):1687–1694, Sept. 15, 1957. 4 figs., bles, 3 eqs., 29 refs. **DLC**—An altitude-variation experiment to determine the absorption n free path in the atmosphere of high-energy nucleons of the cosmic radiation has been performed, g a large ionization chamber and associated counter trays. It is estimated that the nucleons ied in this experiment range in energy from 200 to 2000 Bev, which is a higher energy region n has been investigated previously in similar experiments. The absorption mean free path for ons is found to be 125 ± 9 g/cm^2 and for neutrons 105 ± 8 g/cm^2, and the charged-to-neutral o is 1.54 ± 0.15. These values are in good agreement with previous altitude variation experi-ts. There seems to be no change in the mean free path with energy. Evidence is presented he presence of high-energy nucleons near the cores of air showers, in agreement with previous x. *Subject Headings:* **1. Cosmic ray nucleons 2. Mean free path of cosmic rays.**—*From Author's ract.*

9I–25 551.521.64:523.75

Forbush, Scott E. (*Dept. of Terrestrial Magnetism, Carnegie Inst. of Wash.*), **Large increase of aic-ray intensity following solar flare on Feb. 23, 1956.** *Journal of Geophysical Research*, Wash., C., 61(1):155–156, March **1956.** fig., 2 refs. Also his: (**Correction**) to above article, *Ibid.*, ():169–170, March **1957. DLC**—Cosmic ray intensity following a solar flare at 0300 GMT on 23, 1956, showed a remarkable increase, as shown on graph of values at Cheltenham, Md., and havn, Greenland. This proved to be the greatest increase of the 5 large increases thus far rded at Cheltenham, and greatest increase of all time at lower latitudes. The flare was first rted at Tokyo about 0334, and at Kodaikanal, India, at 0330 h. The increase in cosmic ray nsity began at Cheltenham at 0348 and at Godhavn at 0353; a time lag of 18 minutes after the was first seen. Maximum intensities were 85% and 50% above preflare values at the respective ons. A 33% increase was also noted in Jamaica (29°gm lat) and at Huancayo (0.6°S) 18%, at Mexico City (30°S geomag.) it was 36%. *Subject Headings:* **1. Solar flare (Feb. 23, 1956) osmic ray increase, Feb. 23, 1956 3. Cheltenham, Md 4. Godhavn, Greenland.**—*M.R.*

9I–26 551.521.64:537.591

Heisenberg, Werner, **Die Wechselwirkung der Elementarteilchen.** [The alternations of entary particles.] *Forschungen und Fortschritte*, Berlin, 30(7):193–194, July **1956. DLC**—A psophical discussion of the changes of particles and light quanta, and the origin of electrons and vers. *Subject Heading:* **1. Cosmic ray properties.**—*C.E.P.B.*

9I–27 551.521.64:551.594.12:533

Hess, Victor F. and Manning, A. W., **A study of the ionization produced in various gases by ic radiation.** *American Geophysical Union, Transactions*, 37(6):676–678, Dec. **1956.** 3 figs., bles, 6 refs., 3 eqs. **DWB, DLC**—To study the ionization produced in various gases by cosmic ation, four geometrically similar brass chambers differing greatly in size were used with the -Sherman ionization apparatus. Each of the chambers filled with the gas being studied was ed in an iron house with walls ten cm thick. The residual ionization was determined by using method of Hess. By plotting the ionization in the several chambers as ordinate and the ratio all area to volume as abscissa, and extrapolating for infinite volume, the amount of cosmic ation without any secondary radiation from the walls was obtained. *Subject Headings:* **1. Cosmic onization 2. Ionization of gases.**—*Authors' abstract.*

9I–28

Inoki, M. et al. (*Physics Inst., Yamanashi Univ., Kofu City, Japan*), **Mass measurements of cosmic-ray mesons.** *Physical Review*, 95(6):1565–1571, Sept. 15, 1954. 5 figs., 3 tables, refs.

DWB—By observing the ionization and subsequent range of individual charged slow particle using two cloud chambers set one upon another, we have determined the mass of 36 slow particl in the soft component whose ranges are less than 2.5 mm in aluminum and the mass of 12 particl in the hard component at 300 meters altitude. With regard to the measured masses, we observed significant difference between the results in the soft component and those in the hard componer In the latter, the 21 masses can be interpreted as representing 4 proton and 8μ-meson masses. the former, 11 masses are consistent with the proton mass, whereas the remaining 25, ranging ov values from 54 to 649 electron masses, can hardly be interpreted as the observation of μ mesons onl The results seem to indicate the possible existence of at least two new mesons, the masses of whi would be about 100 and 600 electron masses, respectively. *Subject Headings:* **1. Slow cosmic r mesons 2. Cosmic ray measurements.**—*Authors' abstract.*

9I–29 551.521.64:537.591

Inoki, M.; Yasaki, T.; Machida, M. and Matsukawa, Y. (*all, Yamanashi Univ., Kofu, Japan*) **Mass measurements of slow cosmic-ray mesons.** *Physical Review*, N. Y., 105(6):1872–187 March 15, **1957.** fig., 3 tables, ref., eqs. **DLC**—The masses of slow charged cosmic-ray partic (except those of protonic mass) in the soft and hard components were separately determined measuring momentum, momentum loss, and ionization with a magnetic cloud chamber at sea lev With respect to meson masses, however, we could not find any appreciable difference between t two components. Eighty out of 87 were interpreted as μ mesons, leaving 7 anomalous ones. *Subj Heading:* **1. Cosmic ray mesons.**—*Authors' abstract.*

9I–30 551.507.321:551.521.

Ishii, Chihiro; Maeda, Kaichi and Minakawa, Osamu, **Report on the floating balloon expe ments for cosmic-ray measurements.** *Journal of Meteorological Research*, Tokyo, 6(9):405–41 **1954.** 16 figs., 2 tables, 5 refs. In Japanese; English summary p. 405. **DWB**—In order to stu the cosmic-ray phenomena in the upper atmosphere, balloon-borne nuclear emulsions were lift from the Aerological Observatory at Tateno during the summers of 1952 and 1953. The balloo must float at high altitudes for several hours and the nuclear plates must be retrieved within a sh time after landing. For this purpose, the experiments were performed during the period when ea erly winds prevail in the stratosphere above the Bonin anti-cyclone. Moreover, the balloons w launched just behind the troughs which passed the northern part of Japan. Thus, the balloo drifted away on the westerly winds and were returned by the easterlies in the stratosphere. In t way, the instruments were successfully regained. The details of this experiment and the resu are explained and discussed. *Subject Headings:* **1. Balloon soundings 2. Cosmic ray measureme 3. Tateno, Japan.**—*Authors' abstract.*

9I–31 551.521.64:537.59

Jakeman, D. (*United Kingdom Atomic Energy Authority*), **Production of cosmic ray meso at large zenith angles.** *Canadian Journal of Physics, Ottawa*, 34(5):432–450, May **1956.** 14 fig 7 tables, 9 refs., 6 eqs. **DWB, DLC**—Events have been selected by coincidences between separat shielded trays of Geiger counters and it is shown that they arise from three types of phenome namely, extensive air showers, casual coincidences, and particles traveling in almost a horizon direction. Selection of the last type of event has enabled the absolute intensity to be determi at zenith angles between 88° and 90°. Using a π meson production spectrum which gives consiste with the established underground absorption curve the intensity of particles in the horizon direction has been calculated on the assumption that $\pi-\mu$ decay is the only source of μ meso The calculated intensity agrees well with the observations. Alternatively, by comparing the r in the horizontal direction with the known rate underground, a value of $4.5\pm1.5\times10^{-4}$ sec is tained for the lifetime of the parents of μ mesons which, because of the depth of the atmosphere the horizontal direction (362 m.w.e.), must have energy exceeding 10^{11} ev. This suggests t at this energy the parents of μ mesons can be identified with the π meson, and the number of μ mes arising from the decay of a shorter lived meson (e.g., K meson) must be relatively small. *Subj Headings:* **1. Cosmic ray mesons 2. Cosmic ray showers.**—*Author's abstract.*

9I–32 551.521.64:537

Jongejans, B.; Schurink, F. and Holthuizen, D. J. (*all, Natuurkundig Lab., Amsterdam Uni* **Cosmic ray stars in nuclear emulsions at the equator and at high altitude.** *Physica*, Amsterda 23(2):164–168, Feb. **1957.** 2 figs., 2 tables, 6 refs. **DWB**—Results are reported of a nucl emulsion experiment performed at 4840 meters above sea-level and 0° latitude. For uncove plates a star production of 10.1 ± 0.9 stars per cm^5 emulsion per day at a pressure of 560 g cm^{-} found, being a minimum as compared to data at other latitudes. Within the limits of error, no tenuation is observed for the total star number in 30 cm of lead. For high energy star produc radiation an attenuation length in lead of 550 g cm^{-2} with a lower limit of 310 g cm^{-2} resulted. T number of p stars varies approximately as the number of all stars with latitude. The importa

several checks when doing emulsion measurements is stressed. *Subject Headings:* **1. Cosmic ray rs 2. Cosmic ray showers at high altitudes 3. Nuclear emulsions.**—*Authors' abstract.*

9I–33 523.75:551.521.64

Kane, R. P. and Ahluwalia, H. S. (*both, Physical Res. Lab., Ahmedabad*), **Solar flare effect on e cosmic ray meson intensity at Gulmarg.** *Current Science*, Bangalore, 26(3):83–84, March **1957.** s., 2 refs. **DWB, DLC**—Three of the cosmic ray meson telescopes at Gulmarg, Kashmir station rtitude 9000 ft., geomagnetic latitude 23°5′N) of the Physical Research Laboratory, Ahmedabad re in operation on Feb. 23, 1956 when the solar flare had a magnitude of 3. Each of them reported) counts per hour and the standard deviation was about 4%. A chart provides actual values and oving averages over three consecutive hourly values. *Subject Headings:* **1. Solar flare effects on smic rays 2. Cosmic ray intensities 3. Gulmarg, India.**—*N.N.*

9I–34 551.521.64

Kitamura, Masatoshi (*Met. Res. Inst., Mabashi, Suginami, Tokyo*), **On the unusual increase of smic-ray intensity on February 23, 1956.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere Research in Japan*, 11(2):55–59, June **1957.** 5 figs., 4 eqs. **DWB**—e unusual increase in cosmic ray intensity on Feb. 23, 1956, was observed all over the world as ll as in the impact zone. Maximum intensity of the increase appeared later in high than in low itudes, and the large and typical intensity decrease from Feb. 10–March 1 (minimum on Feb. 20) d the magnetic disturbances on Feb. 19, 20, 21 and 25 leads the author to a model for solar system dium of dispersion of cosmic rays from the sun than the one proposed by MEYER, PARKER and IPSON (*Physical Review*, 104:768, **1956**) which calls for a magnetic field free space enclosed by a ntinuous barrier region of disordered magnetic fields. The author's model is supported by several aphs showing time and latitude. Variations of particle intensity, etc. for two cases, and for ission time of particles received on earth are given. *Subject Headings:* **1. Cosmic ray increase, b. 23, 1956 2. Solar cosmic ray propagation models. I. Meyer, Peter.**—*M.R.*

9I–35 551.521.64:523.74

Kodama, Masahiro and Murakami, Kazuaki (*both Physical Institute, Nagoya Univ.*), **Observan of cosmic-ray neutron intensity at geomagnetic latitude 25°N, Pt. 2, 27-day recurrence tendency d solar activity.** *Journal of Geomagnetism and Geoelectricity*, Tokyo, 8(2):71–75, June **1956.** igs., 2 tables, 3 refs. **DWB**—A remarkable 27-day recurrence tendency of cosmic-ray neutron ensities was noticed through the observation at Nagoya (geomagnetic latitude 25°N, sea level) m Oct., 1954 to July, 1955. This tendency is completely in the same phase with that of the solar ivity during the same period. This phenomenon seems to show that some part of low energy smic rays are usually emitted from the sun. *Subject Headings:* **1. Cosmic ray neutron intensities Twenty-seven day solar activity cycles 3. Nagoya, Japan.**—*Authors' abstract.*

9I–36 551.521.64

Kuz'min, A. I.; Skrypin, G. V.; Tianutova, G. V. and Shafer, Iu. G., **Unikal'naia vspyshka ensivnosti kosmicheskikh luchei.** [Unusual outburst of cosmic ray intensity.] *Akademiia uk SSSR, Doklady*, 108(1):66–68, May/June **1956.** 3 figs., ref. **DLC**—A diagram illustrates apparatus for the continuous recording of large bursts of intense, heavy cosmic rays and the ords of such bursts, which on Feb. 23, 1956, 0345 G.M.T. at Yakutsk (51° geomag. N lat.; 129°E g.; 120 m elev.) are reproduced and analyzed. *Subject Headings:* **1. Cosmic ray intensities Cosmic ray outbursts 3. Yakutsk, Yakut A.S.S.R.**—*I.L.D.*

9I–37 551.521.64

Lockwood, J. A. and Yingst, H. E., **Correlation of meteorological parameters with cosmic-ray utron intensities.** New Hampshire. Univ. Physics Dept., Contract AF 19(604)-75, Scientific port, No. 2, [1956?]. 33+7 p. 4 figs., 13 tables, 37 refs., 2 eqs. Also their: **Study of the neutron ensity in cosmic radiation.** *Ibid.*, Final report, **1956.** 72 p. 8 figs., 13 tables, 47 refs. Second icle also issued in shortened form in *Physical Review*, 104(6):1718–1722, Dec. 15, **1956.** 3 tables, igs., eq. **DLC**—In the first report (No. 2), the results of directional measurements of low and derate energy cosmic ray neutron intensity in relation to weather conditions at Mt. Washington 262 ft) and Durham, N. H. (sea level) were analyzed in detail. It was concluded that barometric ssure which reflects the air mass above the counters, is the only meteorological factor of any nificance and pressure measurements should be very accurate and allow for dynamic effects of h winds around a building or mountain. The pressure effect was found to be about 10%. In final report, it is pointed out that clouds, humidity and temperature have no apparent consistent significant effect that is in keeping with theory. A 27-day periodicity was found in 1952–5 ensity rates. *Subject Headings:* **1. Cosmic ray neutron intensities 2. Pressure effects on cosmic ys 3. Meteorological effects on neutron intensities 4. Mt. Washington, N. H. 5. Durham, N. H.** *M.R.*

9I–38 551.521.

Maeda, Kaichi (*Met. Res. Inst., Tokyo*), **Atmospheric latitude effect on cosmic radiatio** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere Research in Japa* 10(1):9–14, **1956.** 6 figs., table, 3 refs., 5 eqs. **DWB**—In order to clarify the disagreement betwe the distribution of cosmic-ray intensities at sea level and that of equal threshold energies for entra primary particles, the contributions of atmospheric effects are investigated. Although the amou of longitudinal effect can be ascribed to the difference between the geomagnetic and geograph latitude, the cause of the disagreement of both distributions still remains unsolved, owing to t lack of atmospheric data during the measurements of cosmic-ray intensities. *Subject Headin* **1. Latitude effects on cosmic rays 2. Cosmic ray intensities.**—*Author's abstract.*

9I–39 551.508.

Millar, C. H.; Hincks, E. P. and Hanna, G. C., **Large-area liquid scintillation counter and son measurements on high-energy cosmic-ray particles.** *Canadian Journal of Physics*, Ottawa, 36(1 54–72, Jan. **1958.** 12 figs., tables, 15 refs., 8 eqs. **DWB, DLC**—A liquid scintillation counter described which consists of a $29\frac{3}{4}$ in. by $29\frac{3}{4}$ in. by 2 in. plexiglas tank of terphenyl plus α-naphth phenyloxazole (α NPO) in triethylbenzene. The tank is surrounded by a MgO powder and viewe by a total of eight RCA Type 5819 photomultiplier tubes along two opposite edges. For normal incident fast μ mesons a peaked pulse height distribution is observed, 20.5% in width at half-ma mum for the central area of the counter, broadening to 25–30% at the perimeter, and estimated be 25% over-all. When the LANDAU distribution in energy loss (width 18% at half-maximu and the geometric spread are taken into account, a counter resolution function 8% in width at ha maximum is obtained for the central area of the counter, or 18% for the counter as a whole. T most probable pulse height for 0.30 Bev. μ mesons is $1.6\pm0.5\%$ higher than for 2.2 Bev. μ mesons, close agreement with the BETHE-BLOCH theory as extended by SIMON and with a density correcti calculated by the method of STERNHEIMER. Pulse heights from protons in the region 0.3 to 0.8 Be vary directly with the theoretically computed energy loss in the counter. Peak position and resoluti are unchanged by a flux of 12 mr/hr. of thorium γ-rays. *Subject Headings:* **1. Cosmic ray instr ments 2. Scintillation counters.**—*Authors' abstract.*

9I–40 551.521.

Miyazaki, Yukio, **Comparison of cosmic-ray intensity variations observed at different altitud** *Tokyo. Scientific Research Institute, Journal*, 51:97–106, Sept. **1957.** 3 figs., 11 refs., 20 e **DLC**—Simultaneous recordings of cosmic-ray meson component have been made at sea level and mountain altitude of almost the same geomagnetic latitudes and longitudes. The time variation the comparatively low energy side of the primary cosmic radiation could be derived from the co parison of intensity variations observed at different altitudes. *Subject Heading:* **1. Cosmic r intensity variations.**—*Author's abstract.*

9I–41 551.521.64:551.5

†Miyazaki, Yukio, **Cosmic-ray records of the Scientific Research Institute, Pt. 2.** *Tok Scientific Research Institute, Journal*, 49:267–284, Dec. **1955.** 6 tables, 4 figs. **DLC**—Unbrok recording of cosmic-ray intensity is being continued with almost the same apparatus as describ in the previous report (*see* 7D–128, April 1956, *MAB*). The intensities obtained from 1951 to 19 are presented, including monthly average intensity, daily variation and 27-day recurrence tenden (For Pt. 1, *see* 7D–128, April 1956, *MAB.*) *Subject Headings:* **1. Cosmic ray intensities 2. Tok Japan.**—*Author's abstract.*

9I–42 551.521.64:550.38 551.521.64:523

Miyazaki, Yukio and Wada, Masami, **Eleven year variation of cosmic-ray disturbance and relation to solar and geomagnetic activities.** *Journal of Geomagnetism and Geoelectricity*, Kyo Japan, 7(1/2):1–8, June **1955.** 7 figs., table, 11 refs. **DLC**—Variabilities of cosmic ray intensity a horizontal component of geomagnetism (derived from 27 day running averages) are compared a found to show some agreement. At sunspot minima, however, cosmic ray values decrease considera while magnetic disturbance shows no decrease. This suggests that cosmic rays are more clos linked to a solar mechanism than magnetic activity. *Subject Headings:* **1. Cosmic ray-geomagne relationships 2. Cosmic ray-solar relationships 3. Cosmic ray variations.**—*G.T.*

9I–44 551.521

†Nagashima, Kazuo, **Diurnal variation of cosmic rays.** *Journal of Geomagnetism and G electricity*, Kyoto, Japan, 7(1/2):51–68, June **1955.** 8 figs., 30 refs., 41 eqs. **DLC**—A theory ba upon an "electric field hypothesis" is developed, whereby cosmic ray energies at the time of magn storms are interpreted in terms of solar electromagnetic field effects. The theory is applied calculate the altitude and latitude distribution of cosmic ray variation. *Subject Heading:* **1. Cosm ray diurnal variations.**—*G.T.*

9I–45 551.521.64:523.75

Newton, H. W. and Piggott, W. R., **Observational aspects of solar corpuscular radiation.** *International Council of Scientific Unions, Brussels, Eighth Report of the Commission for the Study of Solar Terrestrial Relationships.* Paris, **1954.** p. 101–111. fig., tables, 86 refs. **DWB**—Observations ares and magnetic storms during the declining phase of the last sunspot cycle are listed. The r phenomena, especially radio noise, accompanying the emission of corpuscular streams, the ct detection of such streams and their effects on the ionosphere, aurora, geomagnetism, etc. are ussed. *Subject Headings:* **1. Corpuscular radiation 2. Solar flares.**—*C.E.P.B.*

9I–46 551.521.64:551.521.326

Novyĭ vid nebesnoĭ energii. [New kind of celestial energy.] *V Zashchitu Mira,* Moscow, 4):36–40, Sept. **1956. DLC**—A technical popular article on the discovery, source, and mani- ations of cosmic rays in the atmosphere and the attending photochemical reactions and luminosity he night sky. The possible uses of this "unlimited" source of energy (for peaceful purposes) touched on. *Subject Headings:* **1. Cosmic rays 2. Night airglow.**—*M.R.*

9I–47 551.521.64:537.591.1

Parsons, N. R. (*Physics Dept., Univ. of Tasmania, Hobart*), **Directional measurements of the y variation of cosmic ray meson intensity at $\lambda = 73°$S.** *Australian Journal of Physics,* Mel- rne, 10(4):462–470, Dec. **1957.** 4 figs., 3 tables, 11 refs. **DLC**—Measurements are reported he daily variations of meson intensity at Mawson, Antarctica ($\lambda = 73°$S), recorded by counter scopes inclined at 45° to the vertical in each of north, east, south, and west directions. The lts, together with those from a vertical telescope, are examined and found to be inconsistent h an assumed common origin of the different directional variations in the interaction of an aniso- ic primary radiation with the Earth's dipole field. *Subject Headings:* **1. Cosmic ray mesons osmic ray directional measurement.**—*Author's abstract.*

9I–48 551.521.64

Parsons, N. R. (*Physics Dept., Univ. of Tasmania, Hobart*), **The solar daily variation of cosmic meson intensity at $\lambda = 52°$S and $\lambda = 73°$S.** *Australian Journal of Physics,* Melbourne, 10(3):387– Sept. **1957.** 2 figs., 2 tables, 16 refs. **DLC**—Some preliminary results are given of an investigation olar daily variations recorded by vertically directed meson telescopes at Hobart, Tasmania magnetic latitude $\lambda = 52°$S) and at Mawson, Antarctica ($\lambda = 73°$S). Long-term trends in phase he variation are found to be similar to those reported by observers in the Northern Hemisphere. wever, a substantial and fairly consistent phase difference in local time is apparent between the stations, and its origin is discussed. A brief discussion of pressure-correction procedures is also n. *Subject Headings:* **1. Cosmic ray variations 2. Meson intensities.**—*Author's abstract.*

9I–49 551.521.64

Peters, B. (*Tata Inst. of Fundamental Res., Bombay*), **The primary cosmic radiation.** *Current nce,* Bangalore, 25(2):42–43, Feb. **1956. DWB, DLC.** Also in: *Science and Culture,* Calcutta, 10):576–586, April **1956.** 4+figs. **DLC**—A condensation of the presidential address given to Physics Section of the Indian Science Congress, 1956, summing up the latest ideas on the origin osmic rays (perhaps from Super Nova explosions such as occurred about 900 yrs ago in the b Nebula); the uses in other sciences such as meteorology, oceanography, archaeology, atomic sics, etc. Be^7 and C^{14} produced in the atmosphere by cosmic radiation are the means of dating n sediments, artifacts, trees, or tracing air or ocean movements. *Subject Headings:* **1. Cosmic origin 2. Super Nova explosions 3. Cosmic ray effects.**—*M.R.*

9I–50 551.521.64

Piddington, J. H. (*Div. of Radiophysics, C.S.I.R.O., Univ. Grounds, Chippendale, N.S.W.*), **actic turbulence and the origins of cosmic rays and the galactic magnetic field.** *Australian rnal of Physics,* Melbourne, 10(4):515–529, Dec. **1957.** fig., table, 31 refs., 10 eqs. **DLC**—A absorption mechanism is discussed in relation to the turbulence of the interstellar gas in the ence of a magnetic field. It is evaluated and compared with ordinary viscous absorption in erent types of interstellar gas. Wherever there is a proportion, even though very small, of neutral ns (helium being most likely) the new mechanism predominates for waves of length comparable one parsec or more. The fact that hydromagnetic shear waves, either traveling or standing es, of length about one parsec are heavily damped provides evidence against FERMI's theory of nic rays. The new difficulty must be faced for any of the recent formulations of the theory, being absent when the gas is fully ionized. The mechanism also raises additional difficulties xplaining the observed irregular motion of the Hi gas clouds. The rate of dissipation of magnetic rgy is found the same for hydromagnetic waves and for non-oscillatory distortions of the field; n for a field in a solid conductor. The dissipation time depends only on the conductivity and

the size of the irregularities in the field. Theories of spontaneous growth of magnetic fields discussed critically and a minimum criterion of growth is suggested. *Subject Heading:* **1. Cosmic origin.**—*Author's abstract.*

9I–51 551.52

Podikarov, A. P., **O sverkhsvetovom izluchenii kosmicheskikh chastits v zemnoĭ atmosf** [Čerenkov radiation of cosmic particles in the earth's atmosphere.] *Bulgarska Akademiia Naukite, Sofia, Doklady*, 7(2):29–32, April/Sept. **1954.** 8 refs., 5 eqs. English summary p. **DWB**—The dependence of energy of Čerenkov particles in cosmic rays on the atmospheric he expressed by formulae 4 has been established. On that ground, the existence of such particles been proved and an approximate value about the intensity of the Čerenkov radiation (∼10^4 phc per cm^2 sec.). *Subject Headings:* **1. Čerenkov radiation 2. Cosmic ray height distributio** *Author's abstract.*

9I–52 551.52

Rose, D. C. and Katzman, J., **The sudden increase in cosmic ray intensity of February 23, 1** *Canadian Journal of Physics*, Ottawa, 34(8):884–887, Aug. **1956.** 2 figs. **DWB, DLC**—Rec of nucleon and meson components of cosmic rays measured with neutron monitors and cou telescopes at Ottawa (45.5°N, 57°N geomag. lat) and Resolute (75°N and 83°N geomag.) sho sudden jump on Feb. 23, 1954 at about 0400 universal time. The nucleon component incr was 28 times normal, whereas mean component increase was slight. The time of the incr corresponded with that of a solar flare observed in Japan (0334–0414) and with increases in cos ray activity noted in Europe. The onset of nucleon increase was earlier than that of the me component. The shape of the curve at Resolute was similar to that at Ottawa. Resolute sh have been out of range of particles coming from the sun. *Subject Headings:* **1. Cosmic ray incre Feb. 23, 1956 2. Solar flares 3. Cosmic ray intensities 4. Resolute, Canada 5. Ottawa, Can** —*M.R.*

9I–53 551.52

Sandström, Arne Eld (*Fysiska Inst., Uppsala*) and Eckhartt, Dieter (*Royal Inst. of T Stockholm*), **The cosmic ray increase on Feb. 23, 1956.** *Tellus*, Stockholm, 8(2):279–282, May 1 2 figs., 5 refs. **DLC**—Sandström analyzes the cosmic ray observations made at Stockholm Kiruna on the given date. The Z values from Stockholm displayed a periodic variation prece the sudden increase, and it was well outside the statistical fluctuation. The same variation also present in the N and S records but fell within the limits of statistical error. The minim before the flare effect was present on the record from the cubical telescope but the preceding maxim seems to have occurred before that shown by the small angle telescope. The results for th direction at Kiruna resemble those at Stockholm. On return to normal conditions, that indicate the S-direction in Stockholm was the most rapid; then came the Z direction, while the N-direc indicated a slightly later return. Eckhardt discusses the registration of the soft componen cosmic radiation that has been carried out in Stockholm, Feb. 25, 1956 by means of a neutron mon similar to Simpson's Standard Two-Counter Geometry. The pulse rates of the monitor rose t times the normal. *Subject Headings:* **1. Cosmic ray increase, Feb. 23, 1956 2. Cosmic ray intensi 3. Stockholm, Sweden.**—*I.L.D.*

9I–54 551.521.64:55

Sandström, Arne Eld (*Fysiska Institutionen, Univ. of Uppsala*), **Experimental evidence of directional components of cosmic rays.** *Tellus*, Stockholm, 8(1):18–25, Feb. **1956.** 10 figs., 12 **DLC**—It is possible to resolve the diurnal variation into two components. The first of these ha maximum at 18^h and corresponds to the particle wind predicted in the theory by Alfvén (19 The amplitude ought to be constant, both as a function of geomagnetic activity and as a func of time. The second component has its maximum at 12^h. It represents the sum of the var kinds of radial particle flow, and it ought to display variations indirectly related to geomagn activity. A search for experimental evidence of these components is made possible through determination of the incidental directions of the primary particles by Brunberg (1953) and Bs berg and Dattner (1953). An analysis of C.R. measurements from Stockholm, Nagoya, Huancayo seems to confirm the two components and their expected properties. A very doub amplitude change of the 18^h-component during major magnetic storms is not at variance with the The Stockholm measurements were treated by Sandström (1955) as to geomagnetic effects, t from Nagoya and Huancayo by Seyido and Kodama (1952). A seasonal phase shift reporte the latter for geomagnetically quiet days is compared to measurements in Stockholm. If it e at all, the reported phase shift is evidently due to local effects. Other secular or seasonal p shifts (Elliot and Thambyaphillai, 1953) have not been treated in the present study, as the

ot provide any example of these effects. Several points are open to discussion because of the s being collected with instruments of widely different properties. Directional counter telescopes the most valuable results, if they are designed for a comparatively small aperture and measure least two directions. *Subject Headings:* **1. Cosmic ray variations 2. Geomagnetic effects.**—*or's abstract.*

9I–55 551.521.64:523.74

Sandström, Arne Eld (*Fysiska Inst., Univ., of Uppsala*), **The 24-hrs averages of cosmic ray sity in Stockholm 1947–48 and 1954.** *Tellus*, Stockholm, 8(1):13–17, Feb. **1956.** 3 figs., fs. **DLC**—Curves are given, showing the variation of the 24-hrs averages of the C.R. intensity easured at Stockholm by means of directional counter telescopes during two registration periods ated by six years. During both periods the maximum deviations were 2–3%. In accordance the view expressed by SIMPSON (1954), the periods of maximum are to be regarded as recurrent r than being a harmonic function of time. There are some traces of a 27-day component ng an amplitude of ±0.4 percent. The C.R. intensity as a function of time is compared to the cycles, the relative sun-spot number, the sun-spot area and the K_p-index. *Subject Headings:* **smic ray variations 2. Solar cycle.**—*Author's abstract.*

9I–56 550.38:551.521.64

Sarabhai, V. and Kane, R. P. (*Physical Res. Lab., Ahmedabad, India*), **Effects of the geomagnetic on solar cosmic rays.** *Physical Review*, 92(2):415–419, Oct. 15, 1953. fig., 6 tables, 17 foot- **DWB**—The force acting on a charged solar cosmic ray due to the action of the geomagnetic has been analyzed in terms of its components along the E-W, the N-S, and the vertical directions. certain simplifying assumptions, the relative magnitudes of these components and their direc- have been determined for specific values of the geographic latitude λ of the place of observation, ell as the declination δ and the hour angle t of the sun. The deflection that can be produced e trajectories of solar cosmic rays is qualitatively discussed in terms of the resulting changes h may be expected in the hour of maximum of the diurnal variation of cosmic rays assumed to be to particles from the sun. It appears that the hour of maximum should become later with ase of latitude. In a northern latitude, a north-pointing cosmic-ray telescope should reveal rnal variation with an earlier maximum than a south-pointing telescope. There is a possibility fore of being able to interpret the experimental results of directional studies of the diurnal tion of cosmic rays in terms of geomagnetic effects. *Subject Headings:* **1. Geomagnetic effects smic rays.**—*Authors' abstract.*

9I–57 551.521.64

Schaefer, Hermann J. (*U. S. Naval School of Aviation Medicine, Pensacola, Fla.*), **Die biologisch same Dosis der kosmischen Strahlung im gesamten Höhenbereich der Atmosphäre.** [Bio- ally effective dose of cosmic radiation through the entire altitude range of the atmosphere.] *npraxis*, Karlsruhe, 3(11):417–425, Nov. **1957.** 11 figs., table, 9 refs. **DLC**—Ionization by ic radiation in living tissue is calculated for various cosmic-ray components at different altitudes rapolated to the top of the atmosphere) for various angles of incidence, on the basis of present vledge concerning the profile of cosmic-ray characteristics. Considerable data are presented raphs concerning the behavior of cosmic-ray particles in the atmosphere and in living tissue, it is made clear that possible radiation hazards to man by primary cosmic radiation cannot as be evaluated. *Subject Headings:* **1. Cosmic ray dosages in atmosphere 2. Radiation hazard.** *T.*

9I–58 550.381:551.521.64

Simpson, J. A.; Jory, F. and Pyka, M. (*all, Institute for Nuclear Studies, Univ. of Chicago*), **leriving geomagnetic dipole-field coordinates from cosmic-ray observations.** *Journal of Geo- ical Research*, Wash., D. C., 61(1):11–22, March **1956.** 5 figs., 12 refs., 9 eqs. **DLC**—The 's external magnetic field, extending far beyond the ionosphere, is at present inaccessible to t observation. However, the measurement of the nucleonic component longitude and latitude ts in the region of the geomagnetic equator now offers the possibility for determining the co- ates of an equivalent geomagnetic dipole which represents this external field without encounter- he problems that have heretofore beset the use of meson intensity observations for this purpose. method of measurement and the theory relating the cosmic-ray intensity changes to the geo- netic coordinates are outlined for deriving the two angles which determine the orientation of dipole and the three coordinates giving the position of the magnetic center with respect to the r of the earth. *Subject Headings:* **1. Magnetic field measurements 2. Cosmic ray intensities.** *uthors' abstract.*

9I–59 551.521.64:5

Singer, S. Fred (*Univ. of Maryland, Dept. of Physics*), **Cosmic ray effects on matter at hi altitudes.** *Journal of Aviation Medicine*, 27:111–116, April **1956.** 4 figs., 11 refs. **DLC, DWE** Two effects of cosmic rays on matter are: 1) ionizing or atomic effects, and 2) disintegrating, nuclear effects. The amount, proportion and importance of the various particles deriving fr nuclear bombardment by cosmic rays at different altitudes are discussed and tabulated. Fina the shielding of biological forms against cosmic rays or their secondary products is discussed, a the use of hydrogen shields (H_2O, hydrocarbons, etc.) compared with iron shields and the form found to be more efficient. It is stated that the effects of exposure at 1 day above the atmos. = t effect of 100 days at 16,000 ft. *Subject Headings:* **1. Cosmic ray effects 2. Biological effects cosmic rays.**—*M.R.*

9I–60 551.521.64:523.

Singer, S. Fred, **Cosmic ray time variations produced by deceleration in interplanetary spa** Maryland. Univ. Physics Dept., Contract AF 18(600)-1038, Technical Report No. 50, July **1956.** 9 p. fig., 21 refs. **DWB**—It is suggested that the cosmic ray decreases occurring w magnetic storms (*Forbush events*), as well as the *27-day decreases* of cosmic ray intensity, are modu tion effects produced primarily by the deceleration of cosmic rays in interplanetary space due the expansion of turbulent gas clouds from the sun. The detailed mechanism depends on a statisti decrease of the initially high turbulent fields and can therefore be called an "inverse Swann effe or "inverse Fermi effect." The cosmic ray intensity variation during the *solar cycle* is account for as the cumulative effect of this mechanism which operates in connection with emission of so gas. In this way it is possible also to account for the decrease lasting 6 months observed by Fo BUSH starting in Feb. 1946. Some experimental tests are suggested to discriminate between differe theories for the origin of cosmic ray time variations. *Subject Headings:* **1. Cosmic ray variatio 2. Solar flares 3. Interplanetary turbulence.**—*Author's abstract.*

9I–61 551.521.64:523.

Singer, S. Fred, **On the low energy cutoff of cosmic radiation.** Maryland. Univ. Phys Dept., Contract AF 18(600)-1038, Technical Report No. 51, July 25, **1956.** 7 p. fig., 15 re **DWB**—The low energy cutoff ("knee") in the primary cosmic radiation incident on the earth a parently depends on the solar cycle. It is unlikely that it is caused by a solar magnetic dipole fi and it may not even be quite sharp. A statistical model is developed here to explain the absen of low energy (nonrelativistic) primaries: During periods of low solar activity, interplanetary spa is "smooth" and homogeneous; during periods of high solar activity, however, it is pictured "lumpy" and turbulent, with regions of high magnetic field strength and high gas density coupl because of the good conductivity. Particles which have been decelerated by decreasing fields in the nonrelativistic range are likely to be trapped in a high field region and will disappear there ionization loss. This mechanism of dissipation rather than diffusion does not violate LIOUVILL theorem; in fact, the Liouville factor acts to decrease the intensity of nonrelativistic particles. T position of the low energy cutoff and its change with time can be used therefore as a tool to study t turbulence in interplanetary space. Different experimental approaches are indicated. *Subj Headings:* **1. Cosmic ray variations 2. Solar flares 3. Interplanetary turbulence.**—*Autho abstract.*

9I–62 537.591.2:551.521.

Szamosi, G. and Marx, G., **Klassische Bewegung der Nukleonen im Skalarfeld.** [Classic motion of nucleons in the scalar field.] *Annalen der Physik*, 6 ser., 15(3/4):182–185, **1955.** fi 3 refs., 7 eqs. **DLC**—The work deals with the classical motion of a point-like nucleon in a scal meson field. In a static field the motion can be treated exactly. The results agree with those WERLE, according to which in a pure stretching field (e.g., Yukawa field) a repulsive rotation a occurs if the absolute value of the potential energy exceeds the inertia. Thus it can be infer that the nucleon is surrounded by a sphere of repulsion, the radius of which coincides approximate with the Compton wave-length. Closer examination of the space-time motion shows that t particle moves with the speed of light at the edge of the sphere of repulsion. *Subject Headi* **1.Cosmic ray motion.**—*Trans. of authors' abstract.* (*C.E.P.B.*)

9I–63 551.524:551.521.64 551.543:551.521.

Terashima, Yoshinosuke (*Dept. of Physics, Yoshida College, Kyoto Univ.*), **Atmospheric eff of cosmic rays.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosph Research in Japan*, 10(2):92–95, **1956.** Table, 8 refs., 9 eqs. **DWB**—The author gives reas why there are variations of the cosmic-ray intensity. Changes of the pressure and the temperatu of the atmosphere are the major causes. Series of integral formulas are developed by the auth

or the finding of the pressure–temperature effects of the cosmic-ray's variations and intensity. *ubject Headings:* **1. Cosmic ray intensities 2. Cosmic ray variations 3. Temperature effects on osmic rays 4. Pressure effects on cosmic rays.**—*N.M.*

9I–64 551.521.64:550.38:532.59

Thompson, W. B., **On the acceleration of cosmic-ray particles by magneto-hydrodynamic aves.** *Royal Society of London, Proceedings, Ser. A*, 233(1194):402–406, 29 Dec. **1955.** 5 refs., 2 eqs. **DWB**—A short discussion of the mechanism of cosmic-ray flux is followed by an Appendix: he motion of charged particles in varying magnetic fields. *Subject Headings:* **1. Cosmic ray theory . Magneto-hydrodynamics.**—*C.E.P.B.*

9I–65 551.521.64

Van Allen, J. A. and McIlwain, C. E. (*both, Dept. of Physics, State Univ. of Iowa*), **Cosmic-ray ntensity at high altitudes on February 23, 1956.** *Journal of Geophysical Research*, Wash., D. C., 1(3):569–571, Sept. **1956.** 2 figs., table, 4 foot-refs., 2 eqs. **DLC**—A balloon flight of a single Geiger tube was made from Iowa City at 2000 on Feb. 23, 1956. The maximum observed rate of ounting was 53 counts/sec which corresponds to 4.8 $(cm^2\ sec)^{-1}$ as the flux through a sphere of unit ross-section. This value is about 1.4 times the normal value. An estimated comparison with a imilar flight for March 20, 1956, shows the Feb. counting rate to be 1.65 greater. The Feb. 23 bservations were made during the dying phases of the cosmic ray storms. *Subject Headings:* . **Cosmic ray measurements 2. Cosmic ray increase, Feb. 23, 1956 3. Iowa.**—*S. Fritz.*

9I–66 551.521.64:551.507.321

Van Allen, James A. (*State U. of Iowa*), **Rockoon flights in the Atlantic, Pacific and Antarctic reas.** *American Geophysical Union, Transactions*, 39(3):582–585, June **1958.** 3 figs., table. **DWB**—From Sept. 26 to Nov. 9, 1957, 36 rockoons were launched from the Navy icebreaker U.S.S. "Glacier," as part of the U. S.-IGY program. The first rockoon launching in this series was at 30°N n the Atlantic and the last was at 72°S in the Ross Sea adjacent to Antarctica. This work, together with earlier launchings in the Arctic in Aug. 1957 (described in *IGY Bulletin*, No. 5, Nov. **1957**), onstitutes a unified high-altitude investigation of cosmic-ray, auroral and geomagnetic phenomena rom 75°N to 72°S latitude. As in the earlier work in the Arctic, the Hawk rockoon vehicle was sed, the rocket being a modified Loki II suspended on a long load line beneath a 26,000 cubic-ft lastic balloon and fired by a barometric pressure switch when the balloon reached an approximate ltitude of 23 km. The rockets reached altitudes of about 125 km, a tabulation of these flights eing presented in tables. By Jan. 1958, five sets of flight data had been read and reduced, indicating hat the total cosmic ray intensity at upper atmosphere levels in high southern latitudes is within 5% of that in northern latitudes, and about 4.3 times as great as that near the equator. They lso show that during the present period of high solar activity the latitude knee is found at a latitude ower than 50°S, and that cosmic ray intensity at various altitudes is being systematically plotted gainst geomagnetic latitude. *Subject Headings:* **1. Cosmic ray intensities 2. Altitude effects on osmic ray intensities 3. Rockoon flights 4. Atlantic Ocean 5. Pacific Ocean 6. Antarctica.** —*R.P.*

9I–67 551.521.64:061.3

Van de Hulst, H. C., **Internationale Conferentie over Kosmische Straling.** [International Conference on Cosmic Radiation.] *Hemel en Dampkring*, The Hague, 53(11):201–202, Nov. **1955. DLC-DWB**—A brief account of some of the papers presented at the International Conference on Cosmic Radiation which took place in Mexico, Sept. 5–15, 1955. The discussions covered the elationship between solar flares, cycles of solar activity and cosmic rays, the relationship between 27 day and 11 year cycles and the interplanetary magnetic fields, etc. The names of some of the participants are listed. *Subject Headings:* **1. International Conference on Cosmic Radiation, Mexico City, Sept., 1955 2. Conference reports.**—*I.L.D.*

9I–68 551.521.64

Variations in cosmic-ray intensity. *American Geophysical Union, Transactions*, 39(3):585–587, June **1958.** fig. **DWB**—Observations of cosmic ray intensity at the earth's surface have long revealed many variations, both periodic and non-periodic. As noted in the report, "Thule Neutron Monitor Station," (in *IGY Bulletin*, No. 8, Feb. **1958**), the intensity of the meson (heavy particle) component of cosmic radiation depends in a very complicated manner on the structure of the ever-changing atmosphere. A number of other intensity variations in both time and space are also observed, some of which may give clues to the processes which produce and affect cosmic rays. Types of observed variations in periodic and non-periodic cosmic ray intensity are described briefly, together with an analysis of the more important observations made in comparable years from 1936–1957. *Subject Heading:* **1. Cosmic ray intensity variations.**—*R.P.*

9I–69 550.385:551.521.64

†Venkatesan, D., (*Royal Inst. of Technology, Stockholm*), **The magnetic storm effects and the interplanetary electromagnetic state.** *Tellus*, Stockholm, 9(2):209–219, May **1957.** 7 figs., 7 tables, 37 refs., eqs. **DLC**—The electric field of the beam of rarified ionized gas ejected from the sun has been invoked by ALFVÉN in connection with geomagnetic storms and auroras. An attempt is made to study the effects of this electric field on cosmic rays. From a study of the ionization chamber records published by Carnegie Institution for the years 1945 and 1946, it appears that the deceleration in the electric field seems to be the most important among the types of effects expected in cosmic rays. The study reveals that it is possible to attribute the same mechanism, namely, the beam, to explain both the 27 day variation as well as FORBUSH decreases. The maximum (or minimum) of cosmic ray intensity precedes the maximum (or minimum) of K_p by about 4–6 days. The direction of the electric field of the beam is also discussed. *Subject Headings:* **1. Magnetic storm effects 2. Electric field effects on cosmic rays.**—*Author's abstract.*

9I–70 551.521.64:518.2

Wada, Masami, **Logarithmic representation of cosmic ray intensity.** *Tokyo. Scientific Research Institute, Journal*, 51(1465–1470):201–210, Dec. **1957.** fig., 3 tables, 2 refs., 21 eqs. **DWB, DLC**—To evaluate the quantities which indicate the variational amounts relative to the mean of cosmic-ray intensity, the use of natural logarithm is examined. While a standard unit is required to be determined for the relative intensity when represented by ordinary percentage value, it is not needed for the logarithmic indication. Several advantages due to the use of logarithms are described. *Subject Headings:* **1. Cosmic ray intensities 2. Logarithmic presentation.**—*Author's abstract.*

9I–71 551.521.64

Wada, Masami (*Scientific Res. Inst., Tokyo*), **The statistical analysis of the atmospheric effect on cosmic-ray mesons.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere Research in Japan*, 10(2):95–99, **1956.** 3 figs., table, 11 refs., 9 eqs. **DWB**—Different charts show barometric coefficients vs. heights of several isobars, partial temperature coefficients vs. atmospheric depths and also temperature difference vs. atmospheric depth. A correlation of the barometric pressure with the heights of several isobars at different levels are the means of investigating atmospheric effect on cosmic rays. *Subject Heading:* **1. Atmospheric effects on cosmic rays.** —*N.N.*

9I–72 551.521.64:551.524.7

Wada, Masami and Kudō, Shōko, **A statistical investigation for the atmospheric temperature effect on cosmic-ray intensity.** *Tokyo. Scientific Research Institute, Journal*, 50(1415):1–9, March **1956.** 4 figs., 3 tables, 7 foot-refs., 13 eqs. **DWB**—By taking the partial temperature coefficient into account, the atmospheric temperature effect on cosmic-ray intensity at sea level has been investigated statistically. The method of the present analysis is such that some ambiguous points noticed by OLBERT and by TREFALL can be avoided. The obtained coefficient corresponding to the temperature variation in the upper atmosphere indicates the existence of positive temperature effect due to the π–μ decay phenomenon. *Subject Headings:* **1. Cosmic ray variations 2. Upper air temperature effects.**—*Authors' abstract.*

9I–73 551.521.64

Wilson, J. G. (*The University, Leeds*), **Cosmic radiation.** (In: Bates, D. R. (*ed.*), **The earth and its atmosphere.** N. Y., Basic Books, **1957.** p. 273–286. 4 figs.) **DLC**—Cosmic rays in the atmosphere, energies, decay products of mesons, secondaries, energy dissipation and ionization in the atmosphere, variations produced by geomagnetic, atmospheric depth and solar variations and origin of primary rays, are discussed with schematic diagrams. *Subject Heading:* **1. Cosmic radiation.** —*M.R.*

9I–74 551.521.64:551.594.12

Wilson, Robert R. (*Cornell Univ., Ithaca, N. Y.*) **Atmospheric signals caused by cosmic-ray showers.** *Physical Review*, N. Y., 108(1):155–156, Oct. 1, **1957.** 3 refs., 8 eqs. **DLC**—It is suggested that large cosmic-ray showers can be detected by the electrical signal produced when the ionization of the shower nullifies the electric field of the earth. The signal should have two components, a very short but small signal due to the motion of free electrons, and a slow but possible large component due to the motion of the ions. The energy of the signal is stored in the earth's electrical field until it is released by the ionization. An estimate is made of the size and duration of the signals which indicates that they may be detectable, especially in the case of the slow signal which may have a time of rise of the order of a fraction of a second. *Subject Heading:* **1. Cosmic ray ionization.**—*Author's abstract.*

9I–75 551.521.64

Winckler, J. R. and Anderson, K. A. (*both, Minnesota Univ., Minneapolis*), **High-altitude cosmic-ray latitude effect from 51° to 65°N geomagnetic latitude.** *Physical Review*, N. Y., 108(1): 148–154, Oct. 1, **1957.** 7 figs., 2 tables, 18 refs. **DLC**—A significant latitude effect of approximately 45% for the total vertical cosmic-ray flux has been found over the region 51°N to 65°N at 10 g/cm² atmosphere depth in 1955. No evidence for a primary "knee" can be found separated from the air-path saturation effect with latitude. Since there is evidence that the α spectrum is flat north of 55°, one concludes that the rigidity spectra of primary protons and α's differ over the corresponding rigidity region. Comparison of these data with telescope measurements of POMERANTZ and MCCLURE in 1950 does not show the anticorrelation with sunspot numbers found by NEHER for ion-chamber measurements. The data are not in disagreement with latitude coordinates 4° higher suggested by studies of α particles, and, in fact, the observed latitude "saturation" effects are in better agreement with these new coordinates. A greatly increased counting rate was observed, both at Minneapolis and Flin Flon, Manitoba, on August 26, 1955 at high altitude. *Subject Headings:* **1. Latitude effects on cosmic rays 2. Minneapolis, Minn. 3. Flin Flon, Manitoba.**—*Authors' abstract.*

9I–76 551.521.64

Yagi, Teiichiro and Ueno, Hiroyuki, (*both, Nagoya Univ.*), **Diurnal variation of vertical cosmic rays: narrow total and high energy components.** *Journal of Geomagnetism and Geoelectricity*, Tokyo, 8(3):93–107, Sept. **1956.** 13 figs., 3 tables, 10 refs., 2 eqs. **DWB**—It is well known that anomalous solar diurnal variation S_D of cosmic rays appears at the time of geomagnetic storms. We confirmed the existence of S_D about the cosmic-ray intensities of total component and high energy component penetrating 90 cm lead absorber measured with narrow angle telescope directed vertically. Amplitude of S_D of the total component is the largest and the time of maximum intensities of that of the high energy component is the latest. The phases of S_D are different with five different kinds of cosmic-ray meters in our country. This can be understood qualitatively by the deflections of cosmic rays in the earth's magnetic field. Year to year variation of phase of S_D and long-time variation of amplitude of mean diurnal variation were investigated. *Subject Heading:* **1. Cosmic ray diurnal variations.**—*Authors' abstract.*

9I–77 551.521.64:550.38:523.7

Yagi, Teiichiro (*Physical Inst., Nagoya Univ.*), **Intensity problem in the deflection of cosmic rays in the solar magnetic field.** *Journal of Geomagnetism and Geoelectricity*, Tokyo, 8(3):87–92, Sept. **1956.** 4 figs., 2 refs., 3 eqs. **DWB**—Assuming uniform parallel beam of cosmic rays at infinity is deflected in the general magnetic field of the sun, cosmic-ray intensities at each point of the earth's orbit were calculated. Problem was treated only in the equatorial plane for simplicity. As the intensities change with season, the solar diurnal variation averaged over all season never tends to zero due to the heliomagnetic deflection of cosmic rays. *Subject Headings:* **1. Cosmic ray intensities 2. Cosmic ray magnetic deflection.**—*Author's abstract.*

9I–78 551.521.64

Zawadski, A., **Le spectre des densités des grandes gerbes du rayonnement cosmique à l'altitude de 230 m.** [Density spectrum of extensive cosmic ray showers at an altitude of 230 m.] *Polska Akademia Nauk. Bulletin de l'Académie Polonaise des Sciences*, Cl. 3, 5(2):147–153, **1957.** 3 figs., 10 refs., 5 eqs. Russian summary p. XIV. **DLC**—Experimental data show that the spectrum of extensive showers can be represented in the following differential form:

$$N(\rho)d\rho = K\rho^{-(\sigma+1)}\, d\rho,$$

where N is the number of showers with a density lying between ρ and $\rho+d\rho$, K is a constant, whose value depends on the depth of the point of observation in the atmosphere, and γ varies slowly as a function of ρ. To determine the function $\gamma(\rho)$, a hodoscope of three groups, each containing 18 Geiger-Muller counters, was used. 227,712 individual records of individual groups were obtained. The function measured in this manner is $\gamma = 1.323 + 0.064\ 1n\ (1 + 0.043\ \rho ln)$, where ρln is the density corresponding to the most probable value of $ln\rho$. It is proven that the function $\gamma(\rho)$ cannot be represented as a linear dependence on $ln\rho$ of the type $\gamma = a + bln\rho$, with a probability greater than 0.0001. *Subject Headings:* **1. Cosmic ray showers 2. Cosmic ray spectrum.**—*Trans. of author's abstract.*

9I–79 551.521.64

Zhdanov, G. B. and Khaĭdarov, A. A., **Issledovanie pronikaiushcheĭ komponenty elektronno-iadernykh livneĭ metodom zapazdyvaiushchikh sovpadeniĭ s godoskopom.** [Investigation of the penetrating component of electron-nuclear showers by the method of delayed coincidences with hodoscope.] *Zhurnal Eksperimental'noĭ i Teoreticheskoĭ Fiziki*, 32(4):706–713, April **1957.** 4 figs.,

table, 7 refs. **DLC.** English translation of original article in *Soviet Physics JETP*, 5(4):583–589 Nov. **1957.** 4 figs., table, 7 refs. **DLC**—Using a procedure described previously (*Referat Zhur Fizika*, **1957**, 646), a study was made of the distribution by ranges of slow mesons produced by cosmic rays on nuclei of lead and carbon at effective energies on the order of Bev and above. The authors consider certain peculiarities of the secondary interactions of the penetrating particles of electron-nuclear showers at the same energy values. *Subject Headings:* **1. Cosmic ray showers 2. Cosmic ray mesons.**—*Trans. of authors' abstract.*

SUPPLEMENTARY MATERIAL

9I–80 551.521.64

Antonov, Iu. N.; Vavilov, Iu. N.; Zatsepin, G. T.; Kutuzov, A. A.; Skvortsov, Iu. V. and Khristiansen, G. B., **Structure of the periphery of extensive atmospheric cosmic ray showers.** *Soviet Physics JETP*, New York, 5(2):172–183, Sept. **1957.** Translated by G. M. Volkoff from the original Russian in *Zhurnal Experimental'noĭ i Teoreticheskoĭ Fiziki*, 32(2):227–240, Feb. **1957.** 10 figs., 18 refs., eqs. **DLC**—An investigation of the lateral distribution of various components of extensive showers at their periphery (200–800 m from the axis) has been carried out. The data on the lateral distribution indicate that the contribution of the shower periphery to the total shower particle flux is significant. The lateral distribution of the electron component at the periphery can be explained by means of the theory of multiple COULOMB scattering. COULOMB scattering also plays an important role in the divergence of the penetrating particles (μ-mesons); however, the angles of emission in the elementary events of nuclear cascade processes of $\pi\pm$-mesons which give rise to μ-mesons can apparently also lead to this type of divergence of μ-mesons. An investigation of the intensity of the primary cosmic radiation at very high energies ($10^{16}-10^{17}$ ev) was also carried out. *Subject Headings:* **1. Cosmic ray showers 2. Primary cosmic rays 3. Cosmic ray mesons.**—*Trans. of authors' abstract.*

9I–81 551.521.64:523.75

Boischot, A. and Denisse, J. F., **Les émissions de type IV et l'origine des rayons cosmiques associés aux éruptions chromosphériques.** [The type IV emissions and the origin of the cosmic rays associated with chromospheric eruptions.] *Académie des Sciences, Paris, Comptes Rendus*, 245(25):2194–2197, Dec. 16, **1957.** 8 refs. **DLC**—It is demonstrated that synchroton radiation of relativistic electrons gives an account of the properties of type IV burst which accompany some chromospheric eruptions; the relations existing between this type of burst and the solar emissions of rays are discussed. The cosmic rays are accelerated in the corona, at an altitude near the one measured for type IV, and not in the vicinity of the atmosphere. It is pointed out that a passably large number of eruptions among the most intense should generate cosmic rays which, generally, for diverse reasons, cannot be observed in the Earth's environments. *Subject Headings:* **1. Cosmic rays 2. Chromospheric eruptions.**—*A.V.*

9I–82 551.508.25

Elliot, H. (*Imperial College of Sci. and Tech., South Kensington*), **Standard meson intensity recorder.** *International Geophysical Year, 1957/1958 Annals*, Vol. 4:374–393, **1957.** 17 figs. **DWB**—A list of design specifications for a meson intensity recorder recently adopted by SCRIV is presented in handbook form. A description of the apparatus built by Cinema-Television Ltd., together with the names and addresses of equipment suppliers is given, followed by photographs and circuit diagrams illustrating its use in detail. *Subject Headings:* **1. Cosmic ray intensity recorders 2. Cosmic ray instruments.**—*R.P.*

9I–83 551.521.64:551.594.12

†Giordano, A., **La protezione dai nuclei pesanti dei raggi cosmici al di fuori dell'atmosfera.** [Protection from heavy cosmic ray nuclei outside the atmosphere.] *Geofisica e Meteorologia*, Genoa, 5(1/2):15–21, Jan./April **1957.** 5 figs., 5 tables, 28 refs., eqs. **DWB**—On the basis of a review of the literature, the author discusses the composition of the primary spectrums of cosmic radiation at latitude 40°, their ionizing power of various radiations and the various mechanisms of collision which occur in the atmosphere between radiations and other elements. The most dangerous collision from a biological point of view is that in which a collision produces ionizing radiation in living tissue. The influence of the earth's magnetic field upon the trajectory of heavy nuclei, the variations of the intensity of cosmic radiation with latitude, a detailed analysis of "their dawn hit," the reproduction of radiation conditions in the upper atmosphere under laboratory conditions to study the effects of radiation on living cells, shielding against cosmic radiation at different latitude, etc., are some of the subjects reviewed. *Subject Headings:* **1. Primary cosmic rays 2. Cosmic ray ionization 3. Cosmic ray effects on living cells.**—*I.L.D.*

9I–84 551.521.64:551.507.321

Hopper, V. D., **Device for balloons aids cosmic ray research.** *Weather*, London, 13(5):164–166, ay **1958.** fig., ref. **DWB**—The device for cosmic ray and upper air research (described by YNCH in *Weather*, Sept. **1957**) involves the placing of a metal valve which consists of a hollow uminum tube in the neck of the balloon. The end of the tube inside the balloon is sealed by a ble tennis ball held against the edge of the tube by a light spring. A string is attached to the top the ball and reaches to a rubber cork tied to the top inner surface of the balloon. When the lloon reaches a diameter corresponding to the length of the string, the ball is pulled away from the be so that some of the gas escapes. After all the gas providing the face lift escapes, the balloon aches a level height. Two successive flights with an 800 gm and 1,750 gm neoprene balloon were ade and records of heights attained by each over a period of 9 hrs are presented. *Subject Heading:* **Cosmic ray balloon research.**—*I.L.D.*

9I–85 551.521.64

Kodama, Masahiro et al., **On the unusual increase of cosmic-ray intensity of February 23, 1956.** *apan. Science Council. Ionosphere Research Committee, Report of Ionosphere Research in Japan*, 1(1):20–23, **1957.** 4 figs., 3 tables. **DWB, DLC**—Following the large solar flare which occurred h Feb. 23, 1956, the fifth and largest increase of cosmic ray intensity was observed at the Mt. Norira, Tokyo (Itabashi and Mabashi), and Nagoya Observatories. Coordinates of the Observaries, details of the apparatus used, and quarter-hourly and hourly values of cosmic ray intensities e listed in tables and figures. Compared with the statistical fluctuations (1.6%, 3.7% and 5.4%), increases of appreciable amounts were observed. *Subject Headings:* **1. Cosmic ray intensities Mt. Norikura Observatory, (Tokyo) Japan.**—*R.P.*

9I–86 551.521.64:577

Sandeman, T. F., **Cosmic radiation and its possible biological effects.** *Spaceflight*, London, (8):291–296, July **1958.** 5 figs., refs. **DLC**—In his attempt to stress the importance of learning ore about the cause and effect of cosmic radiation, the author gives the physical background of smic rays, the biological background of the human body in terms of genes and chromosomes, and e genetic effects of radiation upon these body cells. Thus, the dangers of manned space flight re emphasized relative to exposure to cosmic rays and its possible effects upon future generations f children. *Subject Headings:* **1. Cosmic ray intensities 2. Biological effects of cosmic rays.**—*R.P.*

9I–87 550.385.1:551.521.64:523.746

Sekido, Yataro (*Nagoya Univ.*); Wada, Masami; Kondoh, Ichiro (*both, Scientific Res. Inst.*) nd Kawabata, Kin-Aki (*Tokyo Univ.*), **Correlation among magnetic storms, solar phenomena and smic-ray storms.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere esearch in Japan*, 9(3):174–180, Sept. **1955.** 4 figs., 16 refs. **DLC, DWB**—Magnetic storms are lassified into *S*- or *M*-type storms according to whether or not they accompany a decrease in cosmicy intensity. The correlation between the occurrences of the magnetic storms and the central eridian passages of the large sunspot groups is good for the magnetic storms of type *S*. The rrelation vanishes for the storms of type *M*. Like the relative sunspot numbers, the frequency occurrence of *S*-type storms shows a pronounced 11-year cycle variation, while that of the *M*-type orms does not show such variation. The 27-day recurrence tendency of geomagnetic activity is nalyzed by the superposed-epoch method, where the magnetic storms of type *S* and *M* are selected zero days. The curve around the *M*-type storms consists of rather sharp peaks in several cycles ith flat portions in between, which is similar to a curve obtained by CHREE, whereas the curve for -type storms shows almost sinusoidal variation. It may be concluded that *S*-type storms are used by the corpuscular clouds which are ejected from sunspot groups, and the *M*-type storms are used by the corpuscular beam from the so-called *M*-regions. *Subject Headings:* **1. Magnetic orms 2. Cosmic ray variations 3. Sunspot effects.**—*Authors' abstract.*

9I–88 551.521.64:551.54:527(265)

Sekido, Yataro; Asano, Yoshiro and Masuda, Tokio, **Cosmic rays on the Pacific Ocean. Pt. 1, atitude effect. Pt. 2, On the barometer effect of cosmic rays.** *Institute of Physical and Chemical esearch, Scientific Papers*, 40(1136/1139):439–466, July **1943.** figs., tables, refs. **DWB**—During e period from April 1937 to April 1939 measurements were made on board Japanese vessels plying etween Japan and Melbourne, Australia and between Japan and Seattle, Wash. Results are mpared with those of COMPTON and TURNER for route from Vancouver to Sydney, March 1936–n. 1937 and July 1937–Sept. 1938. Instruments are described; barometer and temp. data for very 2 hrs. are used to determine pressure effect. Latitude effect (53°N. to 45°S.) is plotted for ch voyage, each season and for the year, and for various authorities. Atmospheric and magnetic titude effects are also shown graphically. The latitude effect is more important than the atmoeric (temp.) effect, as high surface temperatures are somewhat compensated by the corresponding

low tropopause and stratosphere temperatures and vice versa, so the mean temperature of th atmosphere does not vary as much as the surface temperatures do. Temp. and longitude effec are removed from absorbed latitude effects to give true latitude effects. In Pt. 2, the barometri effect is analyzed for the 10 sections of the 2 routes. Latitude variations of β (barometer effec and σf (barometer-uncorrelated fluctuation) are shown graphically and discussed statisticall *Subject Headings:* **1. Cosmic ray variations 2. Pressure effects on cosmic rays 3. Latitude effec 4. Pacific Area.**—*M.R.*

9I–89 551.521.64:551.508.2

Simpson, J. A. (*Enrico Fermi Inst. for Nuclear Studies, Univ. of Chicago*), **Cosmic-radiatio neutron intensity monitor.** *International Geophysical Year, 1957/1958 Annals*, Vol. 4:351–37 **1957.** 20 figs., tables, 4 eqs. **DWB**—A highly detailed report on instrumentation for measurin cosmic ray intensity changes has been prepared by the author at the request of the Sub-Commissio on Cosmic Ray Intensity Time Variations (of the International Union of Pure and Applied Physics Descriptive figures (including photographs) give the design, specifications, and operation of th neutron intensity monitor, together with sample tables illustrating ways and means for adequa usage during the IGY. The report covers the following topics relative to neutron intensity i struments: 1) The neutron monitor pile, 2) Electronic circuits, 3) Registration of data, 4) Propo tional counters, 5) Auxiliary equipment, 6) Test equipment, 7) Installation of Neutron Monitor Pil 8) Operation and maintenance, 9) A series of monitors for observing C.R. spectrum change 10) Factors contributing to the counting rate and 11) Correction of data to standard atmospheric pre sures. *Subject Headings:* **1. Cosmic ray neutron intensity monitor 2. Cosmic ray instruments.**—*R.*

9I–90 551.521.64:550.3

Simpson, J. A. (*Enrico Fermi Institute for Nuclear Studies, Univ. of Chicago*), **The effectiv geomagnetic field coordinates for cosmic ray particles.** *Journal of Geophysical Research*, Wash D. C., 61(2, Pt. 2):364–367, June **1956.** 3 figs., table, 9 refs. **DLC**—Observations of cosmic ra intensity across latitude lines near the equator give evidence which fits in with the geomagnet field observations in the same plane, if conditions in the outer atmosphere are considered. Grapl show sea-level neutron intensity measurements during Dec. 1954 from 20°S. to 20°N. geomagnet lat. at 100°W. long. and the same during March–April 1955 (15°N. to 28°S.) at 30°W. long. Th former curve has a minima at about the geomagnetic equator whereas the latter has a minima a 9°N. The geographic coordinates for the min. of cosmic ray intensity are plotted lat. against lon and a sine-curve fitted to the data. Two such curves show the difference between the present accepted position of the geomagnetic equator and the effective cosmic ray equator. *Subject Heading* **1. Geomagnetic-cosmic ray equator 2. Cosmic ray intensities.**—*M.R.*

9I–91 551.521.64:550.3

Storey, J. R.; Fenton, A. G. and McCracken, K. G. (*all, Physics Dept., Univ. of Tasmani Hobart, Tasmania*), **Effective magnetic meridian for cosmic rays.** *Nature*, London, 181(4601):34 Jan. **1958.** table, 3 refs. **DWB**—An experiment is briefly described which seems capable of provi ing new evidence on the influence of the earth's magnetic field on cosmic rays. Aerial surveys c cosmic ray intensity made with neutron intensity monitors, closely resembling the design propose by SIMPSON, show a much greater latitude variation than was obtained with charged particle de tectors. The cosmic ray meridian, or line along which the rate of change of cosmic ray intensit is greatest, was determined by 2 triangular flights from Melbourne, at 20,000 ft, using 2 counters in RAAF Lincoln Bomber. Nowhere in Australia is the difference between the declination and th geomagnetic meridian over 2°, so it is not possible to decide which theory is correct (coincidence c the declination or the geomagnetic meridian with the cosmic ray meridian). So tests must be mad from 30° to 50°N. and S. over East and West Hemisphere to obtain sufficient data. *Subject Heading* **1. Cosmic ray-magnetic meridian relationships 2. Geomagnetic meridian 3. Cosmic ray surveys** —*M.R.*

9I–92 551.521.6

Takibaev, Zh. S. and Usik, P. A., **Account of primary α-particles in the development of a nucleo shower in the stratosphere.** *Soviet Physics JETP*, New York, 5(4):752–753, Nov. **1957.** Translate from **Uchet pervichnykh α-chastits v razvitii nuklonnogo kaskada v stratosfere,** *Zhurnal Eksper mental'noĭ i Teoreticheskoĭ Fiziki*, 32(4):924–925, April **1957.** fig., 7 refs., eqs. **DLC**—Measur ments carried out at different geomagnetic latitudes show that primary protons, α-particles, an heavier nuclei possess similar energy per-nucleon spectra up to 4000 M_e2. The value of the intensit of α-particles at the top of the atmosphere was obtained and the curves for the star-producin particles with energy larger than E = 100 Mev were calculated—the latter calculations witho account of the primary α-particles. Results are given in the figure. *Subject Headings:* **1. Cosmic ra showers 2. Cosmic ray primary α-particles.**—*R.P.*

9I–93 551.521.64

Tulinov, V. F., **A study of slow μ-mesons in the stratosphere by the method of delayed coincidences.** *Soviet Physics JETP*, New York, 6(5):894–896, May **1958.** Translated by H. Kasha from **Izuchenie medlennykh μ-mezonov v stratosfere metodom zapazdyvaiushchikh sovpadenii.** *Zhurnal Eksperimental'noĭ i Teoreticheskoĭ Fiziki*, 33(5):1163–1165, Nov. **1957.** 2 figs., 6 refs. DLC—A study has been made of the altitude dependence of μ-mesons of ~100 Mev up to altitudes of about 25 km at 51° and 31°N. latitude. The μ-meson production spectrum in the atmosphere has been measured at these latitudes. *Subject Headings:* **1. Cosmic ray μ-mesons 2. Cosmic ray altitude measurements 3. Cosmic ray altitude measurements.**—*Trans. of author's abstract.*

9I–94 551.521.64(08)

*†Vsesoiuznoe Soveshchanie po Fizike Kosmicheskikh Lucheĭ, 3rd, Moscow, Dec. 15–23, 1954. **Materialy.** [Proceedings of the Third All-Union Conference on the Physics of Cosmic Rays, Moscow, Dec. 15–24, 1954.] Ed. by S. N. Vernov. *Akademiia Nauk SSSR, Izvestiia, Ser. Fizich.*, 19(5):491–608, **1955**; 19(6):611–760, **1955**; and 20(1):5–60, **1956.** figs., tables, refs., eqs. DLC. The Proceedings published in 19(5), 1955 available in English translation as **"Conference on the Physics of Cosmic Rays, Vol. 19, No. 5, 1955, of the Bulletin of the Academy of Sciences of the USSR-Physical Series,"** Columbia Technical Translations, White Plains, N. Y., **1956.** 109 p. Price: $20.00.—Some three score papers on cosmic radiation presented at a meeting in Moscow (Dec. 1954), all by Russian authors, are published in these three issues, covering six subject areas: 1) Interaction of cosmic ray particles, having energies of the order of 10^9eV, with atomic nuclei; 2) Interaction of nucleons and photons, having energies of the order of 10^9eV, with nucleons and atomic nuclei (Vol. 19, No. 5); 3) Problems of the theory of high-energy processes; 4) Interaction of super-high energy particles; 5) New particles (Vol. 19, No. 6); and 6) Variations and origin of cosmic rays (Vol. 20, No. 1). The papers listed below deal with cosmic rays in the earth's atmosphere:

Kocharian, N. M.; Saakian, G. S.; Aĭvazian, M. T.; Kirakosian, Z. A. and Aleksanian, A. S., **Energeticheskiĭ spektr protonov na vysote 3200 m nad urovnem moria,** [Energy spectrum of protons at 3200 m.a.s.l.] 19(5):515–518. 2 figs., 2 tables, 3 refs.—Contains data on the probability of interception of protons, and the proton spectrum in the atmosphere.

Rapoport, I. D., **Spektry ionizatsiĭ chastits kosmicheskogo izlucheniia v stratosfere.** [Ionization spectra of cosmic-ray particles in the stratosphere.] 19(5):519–524. 6 figs., table, 11 refs.—The method of measurement by means of combined use of ionization chamber and counter telescope is described in detail and data on variations of ionizing radiation with height up to 20 km are presented.

Kotenko, L. P., **Issledovanie ionizuiushcheĭ sposobnosti kosmicheskogo izlucheniia na vysote 3200 m metodom stsintilliatsionnogo proportsional'nogo schetchika.** [Investigation of the ionizing property of cosmic radiation at 3200 m altitude by means of proportional scintillation counters.] 19(5):525–532. 5 figs., 12 refs.—Includes graphical presentation of differential spectra of ionizing radiation at 3200 m.

Ageshin, P. N.; Charakhch'ian, A. N. and Charakhch'ian, T. N., **Issledovanie proiskhozhdenia miagkoĭ komponenty kosmicheskikh lucheĭ v stratosfere na geomagnitnoĭ shirote 51°N.** [Investigation of the origin of the soft component of cosmic radiation in the stratosphere at 51°N. geomagnetic latitude.] 19(5):533–536. 3 figs., 3 refs.—The data presented show 1) the presence of a large number of low-energy electrons at small atmospheric depth, 2) softening of the spectrum of electron trajectories with decreasing depth, and 3) a considerable latitude effect upon low energy electrons. From these the authors conclude that the existence of a new mechanism of stratospheric generation of low-energy electron-photon component must be assumed.

Ageshin, P. N.; Charakhch'ian, A. N. and Charakhch'ian, T. N., **Uzkie vozdushnye livni v stratosfere.** [Narrow air showers in the stratosphere.] 19(5):537–540. 4 figs., ref.—Method of measurement and preliminary results.

Ter-Mikaelian, M. L., **Izluchenie i rasseianie bystrykh chastits v srede.** [Emission and scattering of fast particles in a medium.] 19(6):657–660. 3 refs., 9 eqs.—Theoretical study relating the emission due to collision with a single atom to the refractivity index of the medium.

Abrosimov, A. T.; Zatsepin, V. I.; Solov'eva, V. I.; Khristiansen, G. B. and Chikin, P. S., **Struktura shirokikh atmosfernykh livneĭ na urovne moria.** [Structure of extensive air showers at sea level.] 19(6):677–680. 3 figs., 4 refs.—On the basis of hodoscope measurements, data on the spatial density distribution of particles in the central area of showers are presented in two diagrams.

Andronikashvili, E. L.; Bibilashvili, M. F.; Sakvarelidze, I. I. and Khutsishvili, G. R., **Issledovanie kosmichekikh lucheĭ pod zemleĭ.** [Investigation of cosmic rays under the ground.] 19(6):681–686. 1 fig., 2 tables, 3 refs., 5 eqs.—Results of subterranean measurements made with a view to obtaining information on the penetrating component of extensive air showers are reported.

Takibaev, Zh. S., **Perekhodnyĭ effekt dlia "zvezd" i ego sviaz' s kaskadnym razmnozheniem chastits nuklonnoĭ komponenty.** [Transition effect for "stars" and its relation to the cascade

multiplication of particles of the nucleonic component.] 19(6):687–696. 6 figs., 2 tables, 5 refs.—Comparative data on the formation of cosmic-ray stars in lead, paraffin and graphite at different altitudes.

Alikhanian, A. I. and Kamalian, V. Sh., **Spektr π-mezonov na vysote 3200 m nad urovnem moria.** [Spectrum of π-mesons at 3200 m.a.s.l.] 19(6):707–710. fig., table, 2 refs.—Spectra of π-mesons produced in lead are obtained and expressed by an exponential function with an exponent of 3 ± 0.2. In the pulse range $2.35–4.7 \times 10^{-8}$eV s^{-1} nuclear interactions of π-mesons account for less than half of the impulses.

Kozodaev, M. S. and Filippov, A. I., **Izmerenie mass chastits kosmicheskikh luchei pri pomoshchi kamer Vil'sona.** [Measurement of the masses of cosmic-ray particles by means of Wilson chambers.] 19(6):711–714. fig., 3 tables, 7 refs.—Results of measurements of cosmic-ray particles with masses exceeding those of π-mesons are presented. The measurements were made at 3250 m.a.s.l. and at sea level (at Aragats) in 1950–52.

Liubimov, V. A.; Eliseev, G. P. and Kosmachevskiĭ, V. K., **Issledovanie kosmicheskogo izlucheniia na urovne moria pri pomoshchi mass-spektrometra putem izmereniia impul'sov i ioniziuiushcheĭ sposobnosti individual'nykh chastits.** [Investigation of cosmic radiation at sea level with a mass spectrometer by measuring impulses and ionizing property of the individual particles.] 19(6):720–731. 7 figs., 4 tables, 11 refs.—A new technique is described (involving the use of a multiple-tray proportional counter) for measuring with great accuracy the ionizing property of individual particles. The technique is claimed to improve considerably the possibilities of experimental research inasmuch as it permits investigation of spectra of nonionizing collisions of particles over a broad pulse range.

Nikol'skiĭ, S. I., **O prostranstvennom raspredelenii zariazhennykh chastits na malykh rasstoianiiakh ot osi shirokogo atmosfernogo livnia.** [Spatial distribution of charged particles at small distances from the axis of extensive air showers.] 19(6):747.—(*Abstract only.*)

Gol'danskiĭ, V. I.; Zhdanov, G. B.; Nesterova, N. M. and Chudakov, A. E., **Svechenie Cherenkova v shirokikh atmosfernykh livniakh.** [Čerenkov radiation in extensive air showers.] 19(6):747–748.—(*Detailed abstract.*)

Dorman, L. I., **O prirode variatsiĭ kosmicheskikh luchei.** [On the nature of cosmic ray variations.] 20(1):24–46. 13 figs., 4 tables, 72 refs., 13 eqs.—On the basis of world-wide data reported during the last two decades, the magnitudes of various types of variations of the different cosmic ray components and the factors responsible for them are reviewed and summed up in graphs and tables.

Glokova, E. S., **Nekotorye rezul'taty issledovaniia variatsiĭ zhestkoĭ komponenty kosmicheskikh luchei.** [Some results of the investigation of the hard component of cosmic radiation.] 20(1):47–54.—Various types of variations of cosmic ray intensity are analyzed for four widely distributed stations (1936–1950). All world-wide intensity variations of the meson component are found to be related to the corpuscular radiation responsible for magnetic storms and disturbances.

Logachev, Iu. I. and Shafer, Iu. G., **Variatsii intensivnosti kosmicheskogo izlucheniia na bol'shikh vysotakh.** [Variations of cosmic radiation intensity at high altitudes.] 20(1):55–58. 3 figs., 9 refs.—Measurements made at the 300 g cm^{-1} pressure level at Moscow, and at the surface at Moscow and Iakutsk, show simultaneous variations at those levels. These are attributed to a solar activity effect, in agreement with findings reported in DORMAN's article (p. 24–26). *Subject Headings:* **1. Cosmic ray symposia 2. Cosmic radiation. I. Vernov, S. N.** (*ed.*)—*G.T.*

9I–95 551.521.64:523.746

Winckler, J. R.; Peterson, L.; Freier, P. S.; Ney, E. P. and Fowler, P. H. (*all, Univ. of Minnesota*), **Cosmic rays and the sunspot cycle.** *Nature*, London, 181(4619):1317–1321, May 10, 1958. 8 figs., table, 8 refs. **DWB**—Balloon observations of cosmic rays show a marked decrease in intensity of vertical particle flux during spring and summer of 1957, compared with 1955 and 1956, at various latitudes in the U. S. and Canada. Observations were made with a small Geiger-counter vertical telescope and with a single Geiger counter and an ionization chamber, and the two methods compared for Minneapolis for autumn of 1956 and summer of 1957. The second type of equipment has been used repeatedly in IGY soundings. A figure shows the relative intensities at various latitudes from 51° to 64° N. in 1955 and from 51°–59°N. in June 1957. At high alt. and high lat., the values are only half those two years earlier. The decrease corresponds to the sunspot maximum. It results, however, in higher average energy per particle. *Subject Headings:* **1. Cosmic ray decrease at sunspot maximum 2. Minneapolis, Minn.**—*M.R.*

PART III. REVIEWS, TRANSLATIONS, RECENT MONOGRAPHS, AND ANALYTICS FROM SERIALS AND COLLECTED WORKS

Note: Material listed in these sections will not be included in the monthly indexes until abstracted. The item number is mentioned for those titles which have been abstracted in previous issues of **Meteorological Abstracts and Bibliography.**

A. REVIEWS OF IMPORTANT METEOROLOGICAL MATERIAL

enman, H. L.: **Humidity.** London, The Institute of Physics, 1955. 71 p. 19 figs., 6 tables, 22 refs., 7 eqs. Review in *Science Progress*, London, 44(174):323, April 1956. (*For abstract on the original, see* 7.9–7, Sept. 1956, *MAB*)

enning, F. M.: **Electrical discharges in gases.** London, Cleaver-Hume Press, 1957. 78 p. 29 figs. Price, 15 sh. Review by R. Whiddington in *Science Progress*, London, 46(182):360, April 1958.

irie, Antoinette (ed.): **Fallout: radiation hazards from nuclear explosions.** London, MacGibbon & Kee, 1957. 160 p. Price, 12 sh 6 d. Review by P. J. Lindop in *Science Progress*, London, 46(182):364, April 1958. (*See* 9C–125, March 1958, *MAB*)

olson, R. K.: **Look out for heavy ice in cold air pockets.** (In) *Aviation Age*, N. Y., No. 1:230–235, Jan. 1957. 2 figs. (*Conover Mast Publication*). Review in *La Météorologie*, Paris, Ser. 4, No. 47:451, July/Sept. 1957.

itchie, George Stephen: **"Challenger": the life of a survey ship.** London, Hollis & Carter, 1957. 249 p. illus. Price, 30 sh. Review by C. E. N. Frankcom in *Marine Observer*, London, 28(180):103–104, April 1958.

ukovodstvo po operativnomu gidrometeorologicheskomu obsluzhivaniiu narodnokhoziaĭstvennykh organizatsiĭ, Chast 2, Meteorologicheskoe obsluzhivanie [Manual for the operative hydrometeorological service of the national economic organization, Pt. 2, Meteorological service]. Pub. Leningrad, Gidrometeoizat, 1956. Review by V. S. Shkreva, in *Meteorologiia i Gidrologiia*, Leningrad, No. 12:51–52, Dec. 1957.

aucier, Walter J.: **Principles of meteorological analysis.** Chic., Univ. of Chicago Press, 1955. 438 p. numerous figs., tables, eqs. Refs. at end of each chapter. Review by Jay S. Winston in *American Geophysical Union, Transactions*, 38(4):587, Aug. 1957. Review by G. Dady in *La Météorologie*, Paris, No. 47:456–457, Sept. 1957. (*See* 7.3–7, March 1956, *MAB*)

chindler, G.: **Trockenheit auf dem Meere** [Drought at sea]. (In) *Der Seewart*, Hamburg, 18(3): 105–112, June 1957. fig., 7 tables, 3 refs. **DLC.** Review by Richard Schreyer in *Wetter und Leben*, Vienna, 9(6/9):131, 1957. (*See* 9.6–221, June 1958, *MAB*)

chroeder, Wolfgang: **Praktische Astronomie für Sternfreunde** [Practical astronomy for amateur astronomers]. Stuttgart, KOSMOS Franckh'sche Verlagsbuchhandlung, 1958. 180 p. Price, DM 14,80. Review by Martin Rodewald in *Der Wetterlotse*, Hamburg, No. 124:237–241, Nov. 1957.

olar eclipses and the ionosphere: a symposium held under the auspices of the International Council of Scientific Unions Mixed Commission on the Ionosphere in London, Aug. 1955. Editors W. J. G. Beynon and G. M. Brown. London, Pergamon, 1956. figs., tables, eqs., refs. at end of each ch. bibliog., p. 308–319. **DWB** (523.78 s684). Review by F. Steinhauser in *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, Vienna, 10(2/3):274–275, 1958. Review in *Royal Meteorological Society, Quarterly Journal*, 83(358):561–562, Oct. 1957. (*See* 8.8–5, Aug. 1957, *MAB*)

teinhauser, F.; Eckel, O. and Sauberer, F.: **Klima und Bioklima von Wien, II Teil** [Climate and bioclimate of Vienna, Pt. 2]. Vienna, Österreichische Gesellschaft für Meteorologie, 1957. 136 p. 29 fig., 41 tables, 10 charts (fold.), 14 refs. Review in *Royal Meteorological Society, Quarterly Journal*, 83(358):563, Oct. 1957. (*See* 9.1–30, Jan. 1958, *MAB*)

annehill, I. R.: **Hurricanes: their nature and history.** 9th rev. ed. Princeton, Princeton Univ. Press, 1956. 308 p. 141 figs., tables, bibliog. p. 295–303. Price, $4.50. Review by H. H.

Lamb in *Meteorological Magazine*, London, 86(1024):314–316, Oct. 1957. Review in *Mari Observer*, London, 28(180):101–102, April 1958. (*See* 7.6–3, June 1956, *MAB*)

Thorarinsson, Sugurdur: **The thousand years struggle against ice and fire.** *Iceland Museum Natural History, Dept. of Geology and Geography, Miscellaneous Papers*, No. 15, pub. Reykjavi 1956. 52 p. maps, diagrs., illus., bibliog. Review by Trevor Lloyd in *Geographical Revie* N. Y., 48(1):146–148, Jan. 1958.

Townsend, A. A.: **The structure of turbulent shear flow.** Cambridge, Univ. Press, 1956. 315 figs., tables, refs., eqs. **DWB.** Review in *Royal Meteorological Society, Quarterly Journ* 83(357):411–412, July 1957. Review by August Raspet in *American Meteorological Societ Bulletin*, 38(8):498, Oct. 1957. Review by M. J. Lighthill in *Journal of Fluid Mechani* 1(5):554–560, Nov. 1956. (*See* 8.5–10, May 1957, *MAB*)

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UNESCO: **Wind and solar energy: Proceedings of the New Delhi Symposium, Oct. 22–25, 195** Its *Arid Zone Research*, Vol. 7, 1956. 238 p. figs., tables, refs., and bibliogs., eqs. **DW DLC.** Review by H. Heywood in *Science Progress*, London, 45(180):730, Oct. 1957. (*F listing of contents, see* 8(8):1146, Aug. 1957, *MAB*)

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PERIODICALS IN WHICH METEOROLOGICAL ARTICLES REGULARLY APPEAR

★**Acta Geophysica Polonica,** [Warsaw].
Akademiia Nauk SSSR, Izvestiia, Ser. Geogr. and **Ser. Geofiz.,** [Moscow].
American Geophysical Union, Transactions, [Washington].
★**American Meteorological Society, Bulletin,** [Boston].
★**Angewandte Meteorologie,** [Potsdam].
Annales de Géophysique, Centre National de la Recherche Scientifique, [Paris].
★**Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A** and **Ser. B,** [Vienna].
Australian Journal of Physics, [Melbourne].
★**Australian Meteorological Magazine,** [Melbourne].
★**Ciel et Terre,** Société Belge d'Astronomie, Météorologie et Physique du Globe, [Brussels].
★**Geofisica e Meteorologia,** Società Italiana di Geofisica, [Genoa].
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★**Geophysical Magazine,** Japan Meteorological Agency, [Tokyo].
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★**Időjárás,** Magyar Meteorólogiai Társaság and Országos Meteorológiai Intézet, [Budapest].
★**Indian Journal of Meteorology and Geophysics,** [Delhi].
★**Journal of Atmospheric and Terrestrial Physics,** [London].
Journal of Geophysical Research, [Washington].
★**Journal of Meteorological Research,** [Tokyo].
★**Journal of Meteorology,** American Meteorological Society, [Boston].
★**Journal Scientifique de la Météorologie,** Société Météorologique de France, [Paris].
★**The Marine Observer,** Air Ministry, Meteorological Office, London.
★**The Meteorological Magazine,** Air Ministry, Meteorological Office, London.
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★**Przegląd Meteorologiczny i Hydrologiczny,** [Warsaw].
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★**Revista Meteorológica,** Junta Nacional de Meteorología, Montevideo.
★**Rivista di Meteorologia Aeronautica,** Servizio Meteorologico, [Rome].
★**Royal Meteorological Society, Quarterly Journal,** [London].
★**South Africa, Weather Bureau, Notos,** [Pretoria].
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★**Weather,** Royal Meteorological Society, [London].
★**Weatherwise,** American Meteorological Society, [Boston].
★**Wetter und Leben,** Österreichische Gesellschaft für Meteorologie, [Vienna].
★**WMO Bulletin,** World Meteorological Organization, [Geneva].
★**Zeitschrift für Meteorologie,** Meteorologisches Observatorium, Potsdam.

★ Indicates those periodicals which are primarily meteorological.

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